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THE LIVING PAST

A SKETCH OF WESTERN PROGRESS

BY

F. S. MARVIN

FOURTH EDITION

Gird on thy sword, O Man—thy strength endue,
In fair desire thine earth-born joy renew;
Live thou thy life beneath the making sun,
Till Beauty, Truth, and Love in thee are one.

ROBERT BRIDGES.

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PREFACE TO FOURTH EDITION

THE dawn for which we were scanning the horizon with more than the eagerness of the watchman for the morning, is now at last in view. Peace has been declared with our late chief enemy and is being concluded throughout the world. This has occasioned some revision of chapter II, though no attempt has been made to sketch either the course of the war or of the settlement. It seemed unwise to alter the general balance of the book, but necessary to indicate that the confident hopes of earlier issues were not falsified by the event. For the future the author is content, with the mass of his fellow-countrymen, to work and still to hope, for the gradual fulfilment of the ideals which a calm study of the Past must inspire.

Besides these emendations the Appendix on books has been revised and improved. A good many newer books have been substituted for older ones and the sections on Greece and the Rise of Science have been somewhat enlarged. In this work the author has gratefully to acknowledge the assistance of his friend Dr. Charles Singer, now University Lecturer on the history of biology at Oxford.

F. S. M.

BERKHAMSTED,
April 21, 1920.

PREFACE TO THIRD EDITION

THE revision in this edition is altogether about equal to that of the second. The alterations are again due largely to the suggestions of obliging readers who commonly desire the inclusion of more names, or the fuller treatment of certain topics. Something has been done to meet these wishes, while avoiding, as far as possible, the danger of a book of this size, viz. the obstruction of the main current of the argument by a mass of names and details. A few additional books of a popular character have been added to the section of the bibliography on the history of science. It has not, alas, been possible yet to add the section on the satisfactory conclusion of peace, though our hopes are now higher than they have been at any time since 1915.

There is one inexcusable omission which shall be made good if we survive to another issue. John Napier of Merchiston, whose Tercentenary we celebrate this month, inventor of logarithms, should find a place in chapter 8.

F. S. M.

BERKHAMSTED,
April 17, 1917.

PREFACE TO SECOND EDITION

Except in chapter 11, which touches on contemporary events, the revision has been slight. The alterations are often due to a friendly criticism either in the press or in a private letter, and for all such and many kind appreciations of the general purpose of the book I wish to tender my best thanks.

The disappointment of the hopes expressed in chapter 11 by the outbreak of the war made more extensive revision necessary there. But it does not affect either the general argument or the ultimate truth of the forecast. In common with many others I was deceived by the superficial appearance of better international relations, but hold firmly to the belief that the unity of civilization is a real and a growing thing, and that catastrophes such as we are now witnessing can only delay, but not defeat, the purpose of the ages and the nature of man.

Illustrative time charts have been added, with corresponding references in the table of contents. It will enable the person or event named to be placed in chronological sequence without breaking the continuity of the chapter.

F. S. M.

Berkhamsted,
Jan. 5, 1915.

PREFACE TO FIRST EDITION

Public interest in history is clearly on the increase. There is, however, one obstacle to its effective study which is growing likewise, and has in recent years become serious and even threatening. Not only is mankind, by thought and action, constantly accumulating the material for fresh history, but our knowledge of the past is, by the exploration of the world, by the discovery of fresh documents, above all by the widening of our notion of history itself, becoming immeasurably fuller and more complex. The growing interest seems to run some risk of being smothered by the abundance of its food.

The study needs a clue, especially in England where our accustomed methods of teaching and the exigencies of examinations have hitherto precluded the more general view, and the student who comes to the great subject in somewhat maturer years is apt to feel lost in its immensity. The keen teacher anxious to extend his knowledge and improve his methods, the workman in his tutorial class, are well aware of the difficulty. It will increase, for ourselves and others, as time goes on, unless we take steps to meet it.

The clue which this little book follows is no new discovery. It first came clearly into view with Kant and the philosophers of the eighteenth century. Take Kant's theory of universal history as the growth of a world-community, reconciling the freedom of individuals and of individual states with the accomplishment of a common

aim for mankind as a whole. Add to this the rising power of science as a collective and binding force which the century since Kant has made supreme. You have then one strong clear clue which, with the necessary qualifications, seems to offer in the field of history something of the guidance and system which Newtonian gravitation gave to celestial mechanics in the seventeenth century. The growth of a common humanity; this is the primary object to keep in view. But it will prove vague and inconclusive, unless we add to it a content in the growth of organized knowledge, applied to social ends.

The greatest encouragement which has occurred to me during the two or three years spent upon the book, came at the close, in Lord Bryce's Address on April 3, 1913, as President of the International Congress of Historical Studies. It agrees so strikingly and in so many points with the view which I have suggested, that a few words must be quoted. 'The world,' he said, 'is becoming *one* in an altogether new sense. . . . More than four centuries ago the discovery of America marked the first step in the process by which the European races have now gained dominion over nearly the whole earth. . . . As the earth has been narrowed through the new forces science has placed at our disposal . . . the movements of politics, of economics, and of thought, in each of its regions, become more closely interwoven. . . . Whatever happens in any part of the globe has now a significance for every other part. World History is tending to become One History. . . . The widening of the field is also due to a larger conception of History, which (through the aid of archaeology) now enables us faintly to discern the outlines of a process of slow and sometimes interrupted

development of mankind in the Old World during a period each one of the divisions of which is larger than all the time that has elapsed since our first historical records begin.'

To write a small book on such a theme is to court innumerable errors, but it enables me to ask one favour of the reader, and it is this : whatever his own preference may be, however keen his critical faculty, to read the sketch as a whole, and to give the author the benefit of the doubt that his particular point may be implied when it is not expressed or only omitted in necessary deference to the settled plan.

It will be obvious that the book, brief as it is, could not have been completed without the suggestion and advice of more friends than I can mention. But there are four whose assistance I must here gratefully acknowledge by name. Miss F. M. Stawell for helpful counsel in several parts ; Mr. Frederic Harrison for stimulus and encouragement, and for reading a large part of the book in manuscript ; Professor Gilbert Murray for criticism of chapter 4 ; Mr. Laurence Stratford for kind co-operation on the Index.

F. S. M.

Roundhay, Leeds,
May 20, 1913.

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the first home of the Greek spirit. Here 'philosophy' was also born, and here the first stand took place against the power of the East. The origin of exact science in the geometry of Thales and Pythagoras. The first efforts of abstract thinking completed at the time when Athens, after the defeat of Persia, becomes leader of the Hellenic world. Athens in the fifth century B.C. represents the culmination of the Greek spirit in the second third of their millennium. Plato and Aristotle come at the close of this and usher in the last period of review, the completion of Greek science and the decay of Greek nationality. The wider conception now appears of human brotherhood and the 'Inhabited World' as fatherland. But the scientific evolution persists after Macedonia and Rome have suppressed the independent Greek states. Greek science culminates in the last century B.C. with the foundation of trigonometry and the consequent first sketch of a scientific astronomy, and with the completion of a consistent body of geometrical truths, including the beginnings of mechanics. Side by side with the kindred ideas of abstract or general truth in science and ideal beauty in art goes the development of humane feeling. Herein also the Greeks were pre-eminent, but their scientific achievement gives the clearest measure of their advance.

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The Latin tribes akin to the Greeks. Their geographical position, and especially that of the city of Rome, important factors in determining the historical evolution. The great words which we inherit from their language well describe their national work and compare significantly with the scientific terms derived from Greek. They are social, legal, and constitutional. The Roman millennium may be dated somewhat after that of the Greeks, from whom they derived much, both in early and later days. It extends into the fifth century A.D.,

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and endures, with profound changes, for another millennium in the East. The essential Roman movement begins at the close of the sixth century B.C., when consular and senatorial government takes the place of the primitive monarchy. Its development consisted in the parallel extension of Roman power without and equalization of civil rights within the city. This was completed early in the third century B.C. The second century establishes their power in the Mediterranean: the last century B.C. sees the old republican government crushed by the excessive weight of empire placed upon it. The five hundred years of Empire were the consolidation of the Mediterranean world and its gradual permeation by Greco-Roman ideas. Its constructive effects were permanent and beneficial, though the original organization wore out and fell into decay. Roman laws the most striking embodiment of their genius and their most valuable concrete legacy, comparable to the science of the Greeks, and through Stoicism connected with Greek philosophy.

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quent triumph of the spiritual power over the temporal showed its greater strength. It corresponded with needs felt by the best men of the age, and was the guiding influence in its greatest movements—the Crusades, the religious orders, the universities, and scholastic philosophy. The thinkers of the thirteenth century, and above all Dante, express the new spirit as a discipline imposed by divine Love on all nations and on the individual soul.

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By the end of the thirteenth century the Crusades and the revival of study in the universities had set in motion new currents of thought. The Papacy, by overstraining its authority, fell in the fourteenth from its supremacy, and was for a time in subjection. Meanwhile ancient literature and thought were recovered first through Latin and later through Greek authors. This discovery creates a fresh ideal for leading thinkers outside the limits of church authority which had prevailed for a thousand years. In the fifteenth century another stimulus to mental and social movement comes from the exploration of new lands and new routes by the navigators, culminating in the discovery of the New World at the close of the century. The general ferment in men's minds assists the break up of the old Catholic-Feudal system and the rise of strongly organized national governments outside and sometimes opposed to the Papal order. The wealth flowing in from the New World and the extension of commerce creates keen rivalry between the rising Powers, but the general unity of Western Europe and the similarity of moral and intellectual ideas, induced by Roman and Catholic incorporation, still persist. Shakespeare well represents this, leaning rather to the older ways, while at the same moment the foundations are being laid of the new science which is to transform the world.

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The pioneers of modern science, as of the revival of learning, appeared in Italy, which played in the fifteenth century something of the rôle of Greece in the ancient world. The scene of the best painting and art, it was also the first meeting-place of men of science. Galileo, at the beginning of the seventeenth century, founds modern mechanics and by his telescope enlarges men's view of the universe and leads to the formation of the first consistent account of the phenomena of the heavens by Newton. Newton, completing the work of his predecessors, establishes on a rational basis the theory which Copernicus had first launched. This is one of the two main currents of seventeenth-century science. The other is the development of mathematical method, in which Descartes, Newton, and Leibnitz play the chief part. The Royal Society founded to promote physico-mathematical research. Scientific method, thus elaborated, is an extension of Greek ideas, and akin to language in unifying men's minds, as well as correlating the phenomena which it describes. It becomes the most potent link in human society.

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Newton's death brings us to the beginning of the Industrial Revolution. The new science is directly connected with the new expansion of machinery through the steam-engine. A series of improvements in the smelting of steel and iron also take place about the same time. The decade 1760–70 saw the first cotton-mill set up and the first feasible steam-engine. The first Manchester steam-worked cotton-mill in 1789. England becomes unquestioned leader in the new development, largely through physical and geographical conditions. The revolution means the factory as unit in industry in place of the home. Much further specializing in labour goes with aggre-

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gation of labour in factories and towns. The enclosures in the country increase the drift into the towns. The towns promote social organization of all kinds, and are essential to subsequent reform. Thus science organizing industry has its human corresponding to its mechanical side. But on the human side grave, if inevitable, drawbacks.

10

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The industrial revolution incomplete and even disastrous if not accompanied by a change in the general aim of government and all collective action. What this should be was expressed by leading thinkers, especially of France and Germany, in the latter part of the eighteenth century. Human efforts should be combined to secure a state of greater freedom, happiness, and enlightenment for every individual. Such an aim had never before been adopted or even conceived by any government. Applied suddenly, without regard to her past history, and by men unequal to their task, it led in France to a military and aggressive despotism, and ultimately to reaction. The change in the temper of revolutionary France from freedom-loving to conquering, alienates the sympathies of her best friends, and the resistance of England was necessary and beneficial. The final issue of the Napoleonic war is an age of tempered and constitutional progress rather on English lines. But many abuses and ancient obstructions had been cleared away in its course. Other aspects of the new spirit which caused the Revolution were an attachment to Nature, a deeper and more emotional music, and freer and simpler types of literature.

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the ordered form of science, power over nature by engineering and the application of science, and social organization, both within each country and between different nations throughout the world. But behind these the new spirit of humanity and progress, which appeared before the Revolution, is at work. It becomes active in France and England before the middle of the century, and after various hindrances is now generally dominant. Science, vastly extended, has become more biological than mechanical. The ideas of motion and of growth first introduced into mechanics in the seventeenth century now permeate the whole of science. Science begins to co-operate with the spirit of social reform, and has already effected an improvement in public health and the conditions of life. This work of scientific reform brings the nations together and is the strongest safeguard against international strife. Science, engineering, common ideas and common interests, have now made the world one in new and real ways; the three leading nations of Western Europe are actually much more united than their present conflict might let us think. The War and its issue.

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LOOKING FORWARD 266–272

The Western World now enclosing the Atlantic, as once the Mediterranean, has become the dominant influence on the globe. Man's power has from that centre stretched further and further, and become immensely stronger in face of Nature. At the same time he has become more humane, and especially more careful of the weakest human thing, the child. The child embodies for him three of his strongest interests, his sympathy and pity, his interest in origins and growth, and his interest in the future. The man of our own day is devoted to the future and to the child as he never was before.

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I

LOOKING BACKWARD

There are no dead.

MAETERLINCK.

The pious Japanese believe that the spirit of an ancestor is more powerful than that of his living representative on earth. To realize and acknowledge the link that binds you to him is a primary duty, to carry on and extend his fame would be your greatest glory.

This attitude exemplifies in a personal, religious way the true relation of each succeeding generation to all its predecessors, a relation which every step in historical research renders more indubitable and imposing. The past has made the present, and we, who are alive, have the future in our keeping; not that we can form it at will, but that it already exists in germ in us, and that we shall put upon it some impress, great or small, which will be traced back to us by the retrospect of the future. To those who realize this, history becomes a matter of high practical import as well as of theoretical interest.

Two striking facts arrest us at the threshold which seem at first sight in contradiction. On the one hand, the past gains constantly in force, for mankind is accumulating a greater store of knowledge and organized strength, which must determine the character of the future. On the other hand, by studying the past and coming to understand the laws of its evolution each generation acquires greater power as well as more desire to control the sequel. To follow out this apparent contradiction would lead us to the unfathomable problem of freewill. But the actual historical solution is evident and encouraging to our purpose. Man seems to solve it at the moment, and by the very act of realizing it. For, just as he begins to acquire some accurate notion of the

infinite process which is gathering ever more and more urgently behind, he first looks deliberately forward and resolves to use his powers to modify the future according to an ideal. Metaphysics apart, we know in fact that 'thinking backward' has accompanied and inspired a new and passionate effort for 'living forward'.

Though this is true generally of European or Western thought since the latter half of the eighteenth century, we cannot ignore the sceptics and reactionaries who question either the reality of a forward movement in history, or the desirability of conforming ourselves to it. Some of them write books, many more talk and think, of 'civilization, its cause, and its cure'. But when we probe the matter a little closely, we find that the paradoxes are either partial or superficial, and that there is no reason for doubting that general tendency towards human betterment which is implied in the doctrine of 'thinking backward and living forward'.

Note in the first place that such a general belief by no means involves identifying ourselves with every feature of the contemporary society which has issued from the past. We may approve of the industrial revolution, and work for its extension, while labouring to reform the sordid and mechanical life imposed by it upon thousands of our fellow men. We may be fighting the excesses of a sensational press and yet defend the 'liberty of printing' as one of the most precious achievements and guarantees of human freedom. Our moral judgement in short, though itself arising from an immemorial evolution, will and must at any moment rise superior to the concrete result of the historical process. We judge and we select

among the fruits of civilization which time presents, but we are ourselves part of that fruit, and our very judgement is framed by a comparison of what man has done, and of what we know him by his proved and inherited powers to be capable.

With the moral ideal of society we are not here, except indirectly, concerned; but we need for our argument some firm basis of admitted progress on which the threads of the story may be spun. This is ready enough to hand; indeed, the nearness and simplicity of the facts in their main outline are partly the reason why they are so generally passed over by the professed historian. Take, on the one hand, the state of primitive man as we know him, from his earliest remains, from the study of the savage and from biological analogy, and compare this state with that of civilized man as we know him to-day, and what are the most striking social and intellectual differences?

In the first place, civilized man—we speak of him, of course, collectively throughout—has so vastly greater a store of knowledge than the savage that the latter seems by comparison to be as naked in mind as he is in body. In the second place, the knowledge of the civilized man is so organized—arranged and applied—that his power is even greater in comparison with that of the savage than is his knowledge. He weighs the planets and moves mountains, while the savage throws stones and counts to five. In the third place, whereas the savage lives in small isolated communities, civilized mankind is organized in closely-knit societies of considerable size, which for many purposes form one great whole embracing the earth.

Knowledge, power, social unity and organization—here are three striking differences between the savage and the civilized man, three differences in which progressive development can be easily traced, both in historic and prehistoric times. It is not pretended that they cover the field of history. Artistic development is touched by them only incidentally. Law and government appear as subordinate aspects of social organization. But if we set out to establish and define the fact of human progress, we are surely justified in giving the first place in our treatment to those sides of human nature in which the historic development is most marked. These will throw light on the rest, which cannot, of course, be separated or omitted except for the purpose of exposition.

Hitherto the political historian has practically appropriated the whole field, and one school of historians claims the word 'history' for political history alone. What popular history of Greece gives any account of the work of Archimedes, or even mentions Hipparchus? Some of the most approved histories of England allude to Newton only as Master of the Mint. It is high time, especially in England, for a determined effort to see and to present the facts more nearly in their true proportions and, above all, as a whole. If, as is obvious, the facts are too multitudinous and complex to be comprised in any one formula, we are only following the canons of any systematic study in selecting those which give the clearest outline of the whole to start with. History is the account of man's achievements, and in particular of the achievements of the Western leading branch of the human family which now dominates the globe. Our measure of this achieve-

ment, imperfect as it must necessarily be, is to take the primitive savage, from whom it is agreed the process started, and to compare with him the civilized man of the leading type. We have noted what appear to be two or three of the most salient differences. To sketch the story of the change in pictures of well-marked outline blending into one another, as we know all secular changes have blended, whether of the earth's surface or of the societies which have dwelt upon it, this would be a task worthy of the supreme artist-historian of the future. Victor Hugo gave us glimpses of it. Shelley could hear 'a great poem which all poets, like the co-operating thoughts of one great mind, have built up since the beginning of the world'. But no one has compassed the idea in clear and popular expression, basing it, as it must be based, on the growth and application of organized knowledge. There is a gulf not yet bridged between the world of letters and of poetry in which Shelley, of English poets, was the nearest to the conception, and that of science and industry through which the transformation of society has in our time been going on more and more rapidly. Strange that the poets tarry in a world full enough of wonders to make poets of us all! The steam-engine which ushered in our present age, and marks it as surely as the polished axe marks neolithic man, has already in little more than a century endowed mankind with an obedient and inanimate force equal to a thousand million men. No fact in history shows more decisively the growth of human power and its connexion with social organization and reform; and it has taken place in a moment. But it leads our thoughts backward

through ages of accumulating skill and science, and forward to a time when man may be master of himself and his conditions in ways we can hardly yet dream of, and when the magic of mechanical art may set free the latent powers of all for a life of varied exercise and happiness.

The typical portent of an age of factory smoke and monotonous toil, if thus seen through and lived through, would become a symbol of progressive human activity subduing the world.

2

THE CHILDHOOD OF THE RACE

The Child is father of the Man:
And I could wish my days to be
Bound each to each by natural piety.

WORDSWORTH.

From tool to tool, from flint axe to steam-engine, is a striking, palpable measure of man's achievement from his earliest beginnings to our own days. This must not be understood to confine the idea of progress within the limits of the mechanical arts or to suggest that mechanical tools are the highest product of human intelligence. How narrow such a view would be will appear before the end of this chapter. But man's tool-making is so characteristic and progressive, it brings together and exhibits in working order so many of his powers, that if we were isolating one aspect only of his activity, the series of his tools would best display the growth of mind. His antiquity, his existence as man further back in geologic time than had been dreamt of till a few years since, was first suspected and then demonstrated by the discovery and examination of his tools.

It had long been known that savage peoples, who had not learnt the use of metals, made tools and weapons of stone, and the Roman poet Lucretius two thousand years ago made the sound and brilliant conjecture that mankind, advancing beyond the use of hands and nails and teeth, had passed through the three ages of Stone, Bronze, and Iron. But it was not till the middle of the last century, coincidently with the establishment of a progressive geology and an evolutionary biology, that worked flints and human remains embedded in caves and strata revealed to mankind prehistoric ancestors fighting and conquering tens and hundreds of thousands of years before written history begins. Lyell's *Principles of Geology*

began to appear in 1830. Darwin's *Origin of Species* was published in 1859. In the interval a French antiquary, M. Boucher de Perthes, had been speculating on the origin of certain curiously shaped flints dug up with remains of mammoth and rhinoceros in beds of gravel on the slopes of the river Somme at Abbeville. He long maintained the view that they were human tools, and published an account of them as *Antediluvian Antiquities* in 1847; but it was discredited by the accepted notions both of science and religion until the very year of the *Origin of Species*, when an English deputation to Abbeville returned fully convinced, and proclaimed the discovery at a meeting of the Royal Society on May 19, 1859.

A scientific geology had opened the book of man's earliest history: it remained for a world-wide study of its pages, confirmed and corrected by the new biological view of man's descent, to establish the fact that in many and diverse regions, under similar conditions, there had been living, in the remote though not the remotest past, races of men who appear in its record soon after the first of the apes, his nearest kin. Fortunately it is not necessary for our purpose to enter into the question of man's biological descent. The general conclusion is sufficiently clear, though corroborating links and details are still to seek. Much may, no doubt, remain concealed, for our immediate pre-human ancestors, who would complete the genealogical tree, may be embedded in strata beneath the Indian Ocean, where some still look for the true original of the garden of Eden. When we consider, however, that the whole picture of man's

earliest childhood which we possess has been deciphered by the researches of the last fifty years, it would be absurd to set any limits to the results which future inquiries, following the same lines, may produce.

What we already know is sufficient for our purpose here, and is after all only an extension and a confirmation of those visions of man's ascent from a lower state which flashes of genius suggested to many thinkers from Lucretius onwards. The new discoveries enable us to plan out the vast tract of geologic time, compared with which historic time is but a minute in a day, and in rough outline to sketch the main features of human development which were laid down for all the sequel in those unnumbered millenniums of pre-history.

Man's first appearance presents us with another aspect of the great problem of the passage from past to future from which we started. He appears already surrounded and distinguished by the typical marks of human reason and activity of which our later civilization is the unfolding. He has his tools of various kinds: by these he was detected. He can make fire and uses it to cook his food. This we know by the charred bones among the remains. And though we can have no direct evidence of spoken language in a cave or bed of gravel, yet we are assured by a study of the lowest living savages that language, often of a varied and abundant kind, always co-exists with such conditions as have been unearthed from prehistoric times. He is thus distinctly man, and each of these marks of his humanity is something new and unknown to the highest of the lower animals with whom we are compelled on general grounds to assign

him a common descent. Here, then, appears to be a sharp breach in the continuity of past and present which suggests a problem of surpassing interest. On the side of bodily structure we passed it over, although this aspect has received perhaps the closest approximation to a solution. On the intellectual side it is nearer to our subject to consider what is really involved in the question. Can we say that any one of those new and characteristically human accomplishments, if analysed into its simplest mental elements, contains a single trait or act not to be paralleled among the animals? Take tool-making. The ape picks out the stone best fitted to break his nut: this tool-using involves selection and the adaptation of an external implement to carry out an imagined end. The man notices that stones broken in a certain way will cut as well as crush. He picks these out and then begins to imitate the breakage by breaking others. Tools of this simplest type have lately been discovered, to which the name of Eolithic has been given. There is nothing here different in kind from activities admittedly animal and found in various connexions among the animals. Fire is no doubt an invention more difficult to reconstruct with any certainty on any one theory: probably it was arrived at by various routes. But in a world much fuller of natural fires than now, it was most likely to be reached early by a being whose wits had been set working by his necessities and his success. Language, of all problems the most intricate in detail, seems in general principle the easiest to understand from this point of view. All the latest researches have tended to widen that basis of instinctive and imitative cries on

which we may suppose articulate speech to have been built. If these suggested probabilities are accepted—and we are in a region where certainty in detail seems unattainable—then man's creative powers, his highest attribute, are seen to be, like all things else we know, the issue of a slow and often imperceptible process of combining new material and movement with the old. He becomes a maker, not by a sudden leap or inspiration, but by a gradual extension of familiar acts, and this first great step, which now stands out in sharp relief against the background of time, was not essentially different from that daily process of past to future which we noticed at starting, and which contains in itself a perennial problem. Often at later moments of recorded history there have been creative acts which have produced things in themselves more marvellous, more to all seeming like an Athena from the head of Zeus. Such are Greek science or modern music. But in these cases there are links to be found, and we are not dealing with those unfathomable abysses of time in which we now know that the earliest creative acts of man took place. In those long ages of change and growth when human thought and activity were slowly knit together, no wonder if some of the intervening generations and stages in development have sunk out of sight, like subsiding strata in the ocean. In the higher animals, as in the lower races, the civilized man can trace features of his past, embodied and alive: but to the animals he looks across a gulf.

Besides his upright frame, man had from the first one physical advantage over his nearest of kin among the animals, which, small in itself, has had an incalculable

influence in promoting his advance: some have seen in it the chief cause. Compared with the ape's, man's feet and hands are so differentiated that the feet have become a better basis for standing and the hands better instruments for handling. The latter is the greater difference and incomparably the more fruitful in results. Man's hand is broader and—most important point—the thumb is longer, more flexible and more opposable to each of the fingers. He thus gains a means of grasping, turning about, measuring and comparing, which is given to no other being. He can handle and he becomes handy. Looking at a series of stone implements, from the rudely chipped flint of the gravel drift to the perfectly fashioned and finished axes of the Danish peat moss, one might be content to sum up the prehistoric evolution as a progress in handiness, and rest upon the hand as the sufficient cause. Such a line of thought is full of suggestion, especially for the right education of the young human being, which should in broad outlines represent the education of his kind. But as a complete account of the actual process it would be one-sided to the point of perversion. Hand and mind have worked together from the beginning, and it would be at least as probable to argue that advancing mind had occasioned the selection of the fitter hand, as to conclude that the developing hand brought with it an increase of mental power. Both grew together, and one of the greatest intellectual services that anthropology, or the study of early man, can render, is to compel us, as it can in these simpler times, to see the process of human evolution as a whole, before it breaks up into the complexity of

branches that bewilders us in later times. In the same way it is misleading, as some have done, to attempt to isolate one intellectual faculty as the primary cause of man's advance; to say, for instance, that it was his memory which gave him the advantage. We cannot say that it was specially in memory that the first man outstripped his fellows, for in strength of memory it would be easy to match man's power by the animals', and the higher races by the lower. What we are rather led to infer is that a general mental readiness, including quicker observation and a greater power of adapting an old means to a new end, was then as now the most potent force, and that this was assisted by, and in turn promoted, those advantageous differences in bodily structure which were developing simultaneously. This is no scientific explanation, but simply a statement of the problem as a whole, putting foremost those two aspects of it on which most seems to depend. What we see before us is, that, at the earliest stage of which we have authentic remains, man had already won his way to a position of superiority. He was originally, no doubt, mainly frugivorous and arboreal, like the apes; but when we find him, he has begun a career of successful warfare by killing other and larger animals, using their flesh for food and their bones for tools. This is the achievement of the Cave or Palaeolithic man whose stage is so remote, so far below that of the Danish peat moss or the Swiss lake-dwelling, that it is only the facts that both used stone implements and neither have left written records, that lead us to speak of them together. For us in England the gap between the Old Stone Age and the New is marked in the most

striking way by the fact that in the days of the Old Stone men England was still a part of the continent of Europe and the Ouse a tributary of the Rhine. This Palaeolithic Age comprised the last glacial period in the northern hemisphere, when glaciers extended over half the continent of Europe and England had the present temperature of Spitzbergen. The Old Stone men did not first arise under such conditions as these: we know them in our own country in far earlier times, when the climate was more nearly tropical. But they lived through the cold, the men with the least equipment of science or external appliances facing and surviving the severest test which nature has yet imposed upon the Western world. They had no arts but those of fashioning the weapons of the chase, and those simple tools which would enable them to flay the animals and sew their skins for coverings. They could make a fire, but we have no evidence of the rudest pottery. They could kill the wild animals, but had not learnt to tame a single one as a companion in the hunt. Among their remains there are no traces of religious rites nor of the least respect paid to the dead. There are no signs of any higher life, except their marvellous drawings, some scratched on bones and horns, which show the figures of men and animals with a charm and truthfulness suggesting the artistic spirit of old China and Japan. In this one point we know them to have surpassed their successors of the Neolithic Age, and they display that delight in reproducing their impressions, that directness and completeness of perception which are noticeable generally in children, and in such primitive people as the Bushmen of our own day.

A culture such as this spread doubtless over all the habitable globe and filled by far the longest stretch in human existence. It was the age of the hunter, and, limited though his activities were, we know enough of the powers of endurance involved, the unexampled training of the senses, the ingenuity of the devices of the chase, to realize that through all its slow course man was advancing and receiving an education of the most thorough and fundamental kind. Little as we can ever know of it, from one point of view this period must always impress the imagination as no other can. These human figures, the least human of all and apparently the weakest for the task, were conveying to the distant future, often against the greatest odds of nature, the germs of an activity and a world of thought, of which they had not themselves the smallest inkling. The thought of them has something of the same effect upon us as the contemplation of the cosmic forces of light and gravitation and electricity, acting over the abysses of space.

We have now to turn sharply to the other end of the Stone Age, that period which just preceded the use of metals. And if we are to attempt a brief estimate in one composite picture of the sum of human achievement before recorded history begins, two general considerations must be borne in mind. One is that the process of change throughout the prehistoric ages was by gradual, almost imperceptible steps, well shown by the close sequence of any series of prehistoric tools. The further back we go, the slower seems the movement, the more unbroken the descent. The other, that, though the broad outlines of

the evolution are similar throughout the world, and even in detail we are often surprised by close resemblance, yet great differences, both in the nature of the culture and the speed of its development, were necessarily caused by differences of natural environment. Eastern herdsmen were tending their flocks on the plains, while Tierra del Fuegians were heaping mussel-shells on their freezing shores. How potent such external causes were we shall have abundant evidence in later chapters. But coming to Western Europe, we are able to realize with some fullness the point which civilization had reached before metals, on the scene which was to witness its highest growth. It is really nearer to our own than to the culture of the cave, and in point of time far nearer. The continent had then taken its present shape. Great Britain was an island and Europe severed from Africa. The intercourse and influence of Asia on the Western world had been for some time vigorous. Grain and other plants for food had been introduced from the East. All the great fundamental arts, spinning, weaving, pottery, as well as those connected with the tilling of the soil, had long been practised. All the domestic animals which we have since retained, but never increased, had been tamed. It is but a step from this to the use of bronze and iron, which, when first used, were fashioned closely after the model of the tools of stone. How closely in form may be seen by comparing an early bronze axe with its prototype in stone. How closely in time is shown in a vivid way by those peat-moss excavations in Denmark, where three successive layers will be exposed in one place, the top containing remains of beech-trees

with the iron axes used for cutting them, the second layer oak with bronze, and the lowest, pine with the polished stone-axe, which is the typical tool of the Neolithic Age.

This tool, which we put first of concrete symbols, deserves some special notice. When you examine them in hundreds together at the Copenhagen Museum you wonder if accuracy and finish in manual work could go further. In fact their perfection shows us how short a distance mere manual dexterity can take us on the course of human activity subduing the world. It reaches its highest point in the settled communities just before the dawn of history, especially in the great civilizations of which we speak in the next chapter and of which the people of the East now retain most traces. In fashioning these tools of stone—axes and hammer-heads and arrows—the New Stone men were carrying to its conclusion the primaeval tradition of the men of the cave.

Their own special contribution to civilization consisted in developing inventions and arts which have gone on spreading in countless varieties and ramifications ever since, and largely form the framework of later civilized life. It would be out of the scale and purpose of this sketch to describe any of these in detail. But one may say in general that most of the fruitful practical devices of mankind had their origin in prehistoric times, many of them existing then with little essential difference. Any one of them affords a lesson in the gradual elaboration of the simple. A step minute in itself leads on and on, and so all the practical arts were built up, a readier and more observant mind imitating and adapting

the work of predecessors, as we imagined the first man making his first flint axe. The history of the plough goes back to the elongation of a bent stick. The wheel would arise from cutting out the middle of a trunk used as a roller. House architecture is the imitation with logs and mud of the natural shelters of the rocks, and begins its great development when men have learnt to make square corners instead of a rough circle. And so on with all the arts of life or pleasure, including clothing, cooking, tilling, sailing, and fighting.

One or two reflections are suggested, which concern the other aspects of the societies in which these things took place and the ultimate tendency of human progress. One is the observation that this exuberant growth in practical skill did not bring with it a corresponding development in the artistic powers of expression which were so remarkable in the more primitive man. There is a marked comparative dearth of objects showing delight and skill in representing external things: the artistic impulse seems to have become absorbed in decorative and formal work such as we find on the pottery in neolithic remains. Such a diversion of interest and attention is natural enough, and appears at many points in later history.

Another more certain and far-reaching line of thought concerns the positive implications of this advance in the practical arts. What does it imply as to the general social and intellectual level, how far does it take us on the great highway? It clearly involves a far higher degree of social stability and organization. To build a permanent dwelling and cultivate the soil implies the

collection in one place of a larger number of people for a longer time than would be possible to hunters. Hunting no doubt goes on, but it gradually becomes one among other occupations. Now every such aggregation of individuals involves some form of social order and government. Even the lower animals have this, and men when they have their flocks and crops to share, and all the growing complexities of relationship and inheritance to settle, soon develop an order and a code of rules, minute in detail and rigidly enforced. This leads to the recognition of some centre or organ of authority, the head of the clan or tribe. On the more strictly moral and intellectual side there must also be under such conditions a great advance in social feelings, in sympathy, in patience and forbearance. This is not to overlook the barbarous and inhuman customs which disfigure nearly all savage life. Much of this is survival, much is dictated by the inflexible laws of honour and religion. But settled life, with many people in close and constant intercourse pursuing various occupations, brings with it necessarily a training in tolerance, in fellow-feeling, in common interests amid diverse pursuits. The domestication of animals in itself involves a persistence in kindly treatment and a careful study of the character of other creatures, which connote a moral calibre immensely higher than that of the first men of the cave.

In all this we may mark advance, general and indisputable. But we have to ask ourselves how far on such lines as these we can imagine human societies progressing towards the goal which we now see was set before them. The transformation of the wild huntsmen into the settled

village community, with varied arts, is a profound one, and has given us much which is still part of the social fibre. But it does not place man in a position from which we can imagine those great steps forward which raise our highest hopes. His march so far is pedestrian : it clings to the needs of daily life and revolves in the routine. He has to reach the stars and the future. Where in the achievements hitherto described are we to look for the impulse which is to carry him beyond the sphere of practical interests into the region of world-embracing and illimitable thought ? The roots of this later growth, we may be sure, are to be found even in man's humblest origins, for in no case can there be a full-blown flower without a seed.

We turn back to the nature and history of language which we saw reason to associate even with the scraping of the reindeer's bones in the primaeval cave. Like all man's other activities, language is an art, which he developed slowly, advancing by minute steps in extension and co-ordination from the crude and shapeless beginnings which we can only imagine. But language has two qualities which distinguish it from the other arts, and make it the special instrument for carrying forward man's organized activity beyond the working necessities of the small community. These two qualities are of the essence of language and of language alone, and their complete comprehension fully defines it. It is social and at the same time abstract. Each of these points demands some illustration. In the first place language is social, the art of communication. The cries of the animals and the infant demonstrate this, and every advance in language

implies not only that men have more to say to one another, but also that a larger fund of agreed notions has been arrived at which may be put into words. It is thus social, both in its original purpose and at every stage of its growth. It facilitates the progress of the other arts, but itself aims far beyond them. We can imagine the invention and gradual perfecting of the prehistoric tool without the use of language, though no doubt in practice language powerfully assisted the process. But we cannot imagine the formation of a clearly articulated social order with rules and traditions without language ; still less can we imagine the appearance among early men of that world of fancy and speculation which was to them both science and religion. It is on this side that the second quality of language becomes pre-eminent, its power of abstraction. It is so closely allied to reasoning that the same word has sometimes been used of both : the two combined and indissoluble have given man that power which has ultimately enabled him to distance not only the animals but his own beginnings by a height which seems from the lower steps quite inaccessible.

The question is of supreme importance and merits careful thought. The first cry of the animals is no doubt a sign, and so far resembles language. The wild goat may have its special sound to arouse in the mind of its fellows or its young the idea of the wolf or other ravening enemy and lead to flight. As a sign or signal it performs the part of language and implicitly brings two ideas together, that of wolf and that of flight. But it goes no further. Language, before we can properly speak of it as such, has made this implication explicit. It has

become to mankind the instrument for analysing certain common qualities from particular things and making general statements about them. It conveys the general fact in a compendious form that all animals of a certain kind are ravening enemies, that all plants of certain colour and shape are sweet or poisonous, and so on. There is contact and comparison at both ends of the process, of particular objects of sensation at one end, of many human minds in social intercourse at the other. Language is the conducting wire which effects the fusion and enables the ideal world of thought to come into existence.

The savage first revelling in the powers of speech—herein again resembling the child—uses it rather to expand his fancy than closely to define his thought. Thus we have all that wealth of legend and natural poetry which is the glory of primitive people, the delight of childhood. So it is that language gives form to religious ideas and is the essence of a mythology.

We find also in this early growth of reasoning in language the germs of that accurate thought, fitted to the recurring impressions of sense, which develops later into science, and here, as in so many other sides of life, the study of early man throws light on the permanent bearings and harmonies of our nature. The first general conclusion expressed in language about the qualities connected with a group of objects is in the direct ancestry of all scientific thought. The savage, who concludes that all plants of a certain form and colour possess a poison of certain powers, may begin to reason deductively. He has taken the longest and most important step towards combining his perceptions in a form capable of indefinite

extension and application. We can in theory advance directly from such a primitive generalization to the equation and the calculus. But this is in theory only, reading backward into its simplest elements the elaboration of later thought. In practice, however, the prehistoric man comes nearer to science than he possibly can in language or in theory. He knows how to lever with a stick the stone he cannot raise in his hands. But the world had to wait for Archimedes to give it the theory. The Egyptians of the Third and Fourth Dynasty could build with the utmost accuracy and solidity massive and complicated buildings, while their manuals of geometry would not satisfy a Seventh Standard. So practice throughout precedes theory, but cannot advance to its greater triumphs until strengthened and enlightened by theory. And it is in language that reason, which gives the theory, grows and finds its necessary expression.

With the earlier man, however, as with the child, expression in language was a luxuriant thing, an end and a delight in itself, even more than a means to engineer and economize thought. Well for us if we could have secured the latter, without sacrificing the former with all the pleasure and poetry that it implies! In no other respect does the childhood of the race seem to us now so enviable as in its power of vivifying and weaving myths round every object and event in nature. This gift was pre-eminently the savage art, in this our primitive ancestor was most the maker and the type of poets. All nature was alive to him. In everything he saw a force and a spirit like his own. And, like the child, man had

to learn by measuring his powers against the powers without. It was being against being, for everything outside himself, trees, sticks, and stones, as well as animals, might be possessed by a kindred spirit to be conquered or cajoled. It was a world of universal life and activity, of mingled and rapidly succeeding pleasure and disaster, of abject fear and groping strength. The course of ages, the growth of a collective, organizing intelligence, has brought comparative order, and among mankind a wider spirit of harmony and mutual aid. But like most armies on a conquering march, we have spread solitude as well as peace. We have been ruthless to the lower natures whom our forefathers reverenced as their kin and worshipped and fought in turn. Our success, and our solidarity itself, have formed a barrier between ourselves and them.

Perhaps in this age of history, when men's minds are turning to their own origins and the origins of all they see, one of our oldest instincts may live again. The poets of nature and the cult they have aroused, the greater love and care for animals among civilized people, the reappearance of a delight in fairy tales of beasts and birds and trees, the whole philosophy of evolution which links us up afresh with all animated things, are signs of a reviving sense of universal kinship. In this, as in some other aspects which our story may suggest, man seems able, with maturer powers, to renew his youth.

3

THE EARLY EMPIRES

The art of measuring brings the world into subjection to man; the art of writing prevents his knowledge from perishing with him.

MOMMSEN.

We pass from those hundreds of thousands of years which must be allowed for man's existence on earth, and the tens of thousands which may stand for the later Stone Age, to the last millenniums during which great communities have been formed and the records of history begin.

All over the world the conditions of that early life, which were described in the last chapter, have been discovered, with the modifications which we should expect from varieties in race and differences in geographical position and climate. Such modifications persist and extend, as we know, throughout historic time: it is more significant for our purpose to note the widespread similarities. From China to Peru, wherever the physical conditions were favourable, great communities gradually arose, which present the same general features of organization and appear to rest on similar principles of order and belief. The geographical conditions, which would favour such settlements, may be readily understood. The settlement will need some easy means of internal communication to facilitate the interchange of ideas, and enable a common government to be maintained. It must have a fertile soil which will permit it to remain settled in the territory and acquire some wealth. And it must be sufficiently isolated and protected from external disturbance to allow the development of civilizing pursuits. Mountains and desert, sea and river-basins, combine in various parts of the world to give mankind this opportunity. It is most perfectly

realized where, as in India, China, Mesopotamia, and Egypt, you have large rivers irrigating their basins and providing a constantly fertilized soil, and where mountains and sea enclose the country, while permitting a certain amount of foreign intercourse.

Many causes, largely geographical, combined to make the Mediterranean countries the scene of the most rapid advance in civilization. With our eye therefore on the sequel, we concentrate our attention at this stage mainly on the two great river-valley civilizations, in Egypt and Mesopotamia, which were nearest to the Eastern Mediterranean. From these, together with the kindred culture of the Aegean, centring in Crete, the 'classical' world arose. In thus limiting our view we are in no sense belittling the achievements of other races in other regions. In many points, more perhaps than we are yet aware of, the Further East contributed to Mediterranean culture: in some ways we have still to learn and to assimilate its spirit. But the Mediterranean current has conquered and pervades the world, and those who will follow its progress must keep their eyes fixed on the main stream, and treat all others either by way of supplement or of comparison.

So far indeed and even later—until the advent of the Greeks—it is the uniformities of human progress that most impress us. Not till they appeared, the chief moving factor in the Mediterranean world, could that sharp line be said to exist between the progressive and the backward, the civilized and the barbarian, which has divided the world ever since. East and West moved on till then with fairly equal steps, and we concentrate our

attention on the great civilizations near the Mediterranean, mainly because they are on the scene and provide the material, for the quick-moving drama which was to follow.

The civilizations of the two great river-basins, the Nile and the Euphrates, are so much alike in their history that a common origin has often been suggested for them, and even if we assume, as is most likely, an original independence, the mutual borrowings and intercourse must have been both early and frequent.

The broad coincidences in their chronology are significant, and lead on gradually from the first fixed point in history, when at the end of the fifth millennium B.C. the Egyptian calendar was settled, through the conquering, centralizing period which culminates early in the second millennium, into that new life which begins to stir with the movement of the Jewish and Hellenic tribes. The first fixed point is an interesting and familiar one, having been accepted for nearly 2,000 years as the date of the 'Creation of the World'. We know it now not only as the beginning of the Egyptian calendar, but also as the first moment at which we can be confident that the men now called Sumerians had settled in the lower Euphrates valley, bringing with them the seed of a higher culture and, above all, the elements of cuneiform writing.

In substance, too, the evolution of the two civilizations is strikingly alike. Smaller communities of varied racial origin are slowly welded together under conquering chiefs, whose power is supported by a religious system, also slowly elaborated, in which the divine and human are so closely intertwined that ultimately in each case

the ruler and the leading deity are practically identified. In each case a lower and an upper kingdom are finally amalgamated round a central city, in the one case Memphis, in the other Babylon, some way removed from the river's mouth. In each case the priestly order, in close alliance with the throne, devotes itself, in opulence and leisure, to the elaboration of the theological system by a study of the heavens. In each case these observations give valuable material and stimulus to later science, and especially in two spheres of their activity results are achieved of the highest lasting service to mankind. To their beginnings in measurement and calculation we owe most of our common units of time and space, and to their invention of writing probably the origin of our own. It is these written records which have revealed them to us, and formed to them also one of the strongest links between successive generations. In each case, too, we note in the earliest periods an extraordinary freshness and fineness in their artistic work, which is similarly marred later on in both by the extravagances of an imperialist spirit and the rigidity of convention.

A curious analogy of another kind between the two great river-empires is seen in the fact that on the frontier of each there was another civilization, in contact with it and acting as a channel to Greece. Egypt has the Minoan or Aegean empire on its sea-front, and Babylonia has the Hittites on the highlands of Asia Minor. Neither of these is as yet so fully known as the culture of the Nile and of Mesopotamia, and neither is so perfect a type of the civilization which summed up the slow process of primaeval time.

Our knowledge of this third great stage of human

progress (counting the Old and New Stone Age as distinct periods) is far greater in detail and much more complete and significant than that of the two earlier stages. Egyptology and Assyriology are two of the most signal triumphs of patient research and imaginative reconstruction. Ancient tombs and the sites of ancient cities have yielded their evidence, oftenest in the form of artistic objects, fragments of sculpture or pottery, jewellery or utensils of metal. Inscriptions and written records on rock or clay or papyrus roll have been deciphered and their data compared with the other evidence, with the traditions handed down by the classical writers, especially of Greece, with every reference which they make to a tribe or a place or a person, mythical or real. It is a strictly scientific process, analogous to that by which, as we have seen, the evidence of caves and fossils has been collated with that of living animal forms to compose the record of man's biological history. And in archaeology it is the written record which plays the part of the living animal form in the history of species. For in the written record we have before us what the men of that age actually thought and were concerned with, as in the living animal form we have the actual result of one line of the evolutionary process ; and by the witness in each case of the speaking document, whether of bygone thought or bygone life, we may bring together and interpret the other scattered and inarticulate remains.

The hieroglyphs of Egypt and the cuneiform writing of Babylonia are a discovery of the last few decades, and by that one achievement Champollion and Grotefend placed us really nearer to the ancient Egyptians

and Babylonians than were Herodotus and the other Greek writers who first studied and wrote about them more than two thousand years ago. But in one important point the first Greek students of ancient Egypt were not misled, and have left the right clue for understanding the structure and history both of Egypt and all the other early communities at the same stage of culture. This primitive writing which they saw engraved on the walls of tombs and temples, but could not read, was to them a 'hieroglyph' or 'sacred writing', devised by the priests and used for religious purposes. Herein they point back to the true origin of Egyptian unity, the root of all the strength of theocratic civilization. 'The Egyptians are exceedingly religious—or god-fearing—beyond all other men;' so Herodotus wrote, before entering on the details of their history. It was the only such community he had personally investigated; it remains to us the most perfect type of the primitive theocracy, the one most completely isolated in its early stages from outside influence and interference.

To us, as to him, the religious spirit and the religious framework appear the most striking features of these societies, when we compare them with the earlier civilizations of the cave or the lake-dwelling or the nomad tent. We note of course their greater size, their more abundant material resources, the exquisite fineness of their artistic work, their massive architecture and their elaborated codes of law. But beneath and surrounding this is the religious structure which inspired and held it all together. It is this which marks them all unmistakably, from East to West, and has gained for such civilizations

the name of 'Theocracies', implying the union in their system between the earthly ruler and the powers of the other world, which to these early thinkers was as real—in the same sense—as our own, and much more populous.

At no other stage in history are we so much impressed by the conservative aspect of the human spirit. The whole fabric of theocratic life and thought is found to be built up of earlier elements of immemorial antiquity, of those spontaneous beliefs in fetishes and spirits which marked the earlier stages of culture. Primaeval custom and belief, preserved, amalgamated, and transformed, grew at length into a firm rich soil in which the new ideas of the Greeks could take root and nourishment. In thus preparing the soil for a progressive spirit to work upon, we recognize a necessary and fundamental service of the theocratic ages. But on the side of organization, for bringing and holding together the largest societies which had yet been upon the globe, our debt to these communities is even greater. This the Greek spirit would seem to have been incapable of achieving. They might quite well have invented writing without the aid of Egypt, and possibly did so in their disguise as Cretans. They might, without the Babylonians, have learnt to divide the circle into 360 parts and the year into months. But for the task of building up a great society round one centre of government, the scientific intellect is of itself unsuited: it is a probe before it is a link. This, by slow elaboration on a religious basis, the men of the river-valleys accomplished, and handed on as the goal of a practicable ambition to the Persians, to Alexander, and to the Romans.

Hence at this point, in tracing the growth of an organizing human activity in the world, we are bound to give a larger space and greater weight to the religious beliefs of the people than either in the ages before or in those which immediately succeeded.

From the spontaneous worship and mythology of primitive men, elaborate and co-ordinated systems arose, linked inextricably with the fortunes of the tribes and rulers who had professed and carried them to victory. It was an age-long process due to a multitude of causes and not only, or even mainly, as certain eighteenth-century philosophers believed, to the interested machinations of the priests. The typical scheme which emerges in the middle of the theocratic millenniums and is familiar to us in the orthodox polytheism of Greece and Rome, the scheme in which the sky, the sun, and the planets hold high place and the deities of the earth and daily life are under their control, is by no means the primitive one. To the earliest philosopher the trees, the rivers, and the teeming earth were the more potent deities, and of the heavenly bodies the moon was the first to arouse his awe and speculation. Its movements are more readily calculable, and it reigns in the dark night more obviously surrounded by a host of minor lights. It was prolonged reflection and a more mature intelligence which perceived the superior importance of the sun and raised him to the high place which he holds in all the later systems. This step the Egyptians and Babylonians in their prime, like most corresponding civilizations, had long taken. Among the host of local and tribal gods which followed and assisted the fortunes

of their worshippers, one aspect of the Sun-god became supreme in Egypt, and in time the Pharaoh was identified with him. At first deification followed the Pharaoh's death and led to that sumptuous and stupendous provision for the dead which is one of the wonders of the world and has been the means of preserving the records of their early history. In later times the living Pharaoh is divine and the theocratic scheme is complete. Doubtless the corporations or orders of the priesthood counted for a large share in this evolution. In Egypt they are said at one time to have owned a third part of all the land, in the name of the gods whom they served. The self-interest, which is obvious, the trickery, which must have been frequent enough, are subordinate considerations in view of the strength of the beliefs and of the social cohesion which are implied in such a system. It is noticeable that in Egypt, where the theocratic idea was most fully realized, the social structure persisted the longest in the least altered form. Their religion, by its practices and institutions as well as its belief, held these societies together in time as well as in space.

Order and consolidation, therefore, based on religion, mark this stage of progress, with results varying in varied circumstances. One feature was prominent in one civilization, which was less marked in another. In the East caste is a distinguishing feature of the system, and strengthens its social conservatism. Now caste, as such, was unknown in Egypt, though the principle of heredity had full sway in the ruling and priestly families, and, speaking generally, occupations followed the hereditary rule. The fellah's son remained a fellah, just as the priest's became a priest. Such

is the simplest rule of social continuity, and it appears in human evolution side by side with the worship of ancestors. Both are strong but crude expressions of the awakening consciousness that the past is living with us, that we are but the passing agents of an eternal spirit to which we owe all we have and are. Egypt is here also the most striking instance. China made a more general and moralizing use of ancestor-worship. But no other nation ever made so steady and supreme an effort to protect their great dead and perpetuate their memory as did the Egyptians throughout the long ages of pyramids, rock-tombs, and embalming. They spent themselves upon it, and in return we have learnt more about them than of any contemporary people. Their tombs are storehouses of the art and literature of the time. Jewellery, glass, furniture, objects of all kinds for the sustenance and recreation of the dead, were placed there, with papyri and inscriptions recording their titles and achievements. The rocky hills which enclose the Nile basin are full of such tombs, and the plains are studded with pyramids great and small, built with the same end in view. These structures, especially the Great Pyramids, which go back to the beginning of the fourth millennium B.C.—the date of which we noted the curious fortune above—are the most eloquent stone documents in the world. They mark the culmination of the political system based on religion from which the Old Kingdom and civilization of Egypt arose. They express in its most imposing concrete form the spirit of sacrificing the present to the glory and preservation of the past. They imply wholesale slavery and the wholesale devotion of human life to a public though

extravagant purpose. For us they have the special value of recording, as clearly and more permanently than any book, the extent and the strength of the mental grasp and practical skill of the men who planned and executed them.

A colossal building, of neatly-finished, closely-compacted stones, of simple design and homogeneous in its parts, heavy and stable, and without light or sense of movement, the pyramid is no inapt image of the society which erected it. It certainly stands as a fit symbol of the country to which a universal ancient tradition ascribed the origin of the science of measuring.

That the origin of science in the strict sense was due to the Greeks will be seen in the next chapter: that man from the earliest ages was accumulating the experience and the practical skill which are the raw material of science, we have already seen. In the latter sense the men of Egypt were treading in the path already worn by generations of earlier workers, and which other people were treading independently. But they had two advantages. Their land was specially in need of measuring after inundation, and specially easy to be measured. And they had growing up among them a strong and numerous body of priests, who were undoubtedly the class, both here and elsewhere, who carried forward to the furthest point before the advent of science, the collection of observations and measurements on which true science was to work. The strength of the Egyptians in geometry must be judged rather by their works than by the faulty theorizing to which allusion has been made. The planning of such a building as one of the greater pyramids, the perfect finish and fitting

of every stone, the mechanics of transport and elevation, are clearly an achievement of the highest practical skill as well as of commanding intellect, however limited the analysis may have been of the principles involved in the work. How far this had actually proceeded we cannot with any certainty affirm. The extant treatise of the second millennium B.C. may easily be the work of a careless or unintelligent scribe or school. But it is certain that there is no positive evidence that even the architects and engineers of the pyramids had any comprehension of the abstract laws either of figures or of motion. It may be that they never advanced beyond the conception of angle as slope and that the abstraction of angular distance was the crucial step which they were never able to take. This fundamental act of generalized measurement the Greeks accomplished, and it is connected in the tradition with Thales. The stories of the Egyptian methods of astronomical measurement fit in with this conclusion; the hours of the night being determined by the passing of certain fixed stars over different parts of the watch-keeper's person, who was seated on the ground with a plummet before him. The position of the stars would then be noted on the tables as 'in the centre', 'on the left eye', or 'the right shoulder', and so on.

If the Egyptians were the pioneers of geometry, or measurement as applied to the land and terrestrial objects, the Babylonians were of greater force in celestial measurement and observation. They had wider plains for their star-gazing, and were more in touch with the nomad tribes to whom star-gazing was an immemorial and absorbing interest. The Babylonians

had from early days those temple-towers of seven stages, which served as observatories and marked their knowledge and reverence of the seven planets. To them, too, we owe the week with its seven days, and the signs of the zodiac, which did not make their way into Egypt until much later times. But there is no more evidence in Chaldaea than in Egypt of any scientific analysis of their observations, or of rational inference as to the properties of the bodies observed and the causes of events. On the contrary, in both cases the study of the heavenly bodies was closely connected with superstitious uses. The stars were studied for their supposed influences on human life and not as the basis of human science, and the Chaldean priests must be reputed rather as the founders of astrology than of astronomy. But in this case, as often later in the history of thought, the by-products were more valuable than the immediate purpose.

If, as was suggested above, order and consolidation should be regarded as the special marks and contributions of these civilizations to general progress, it is easy to see how their achievements in measuring and calculation and writing arose from and assisted this main purpose. The measurement of land was an essential condition of the orderly co-operation of a large number of individuals, or of corporations, cultivating a continuous territory. The measurement of time was no less necessary for the common performance of public functions, especially the religious ceremonies for which the whole calendar seems originally to have been devised. The week, as is well known, was formed by assigning a day in turn to each of the principal heavenly powers who was

supposed to preside over it. The months in Egypt were in the same way named after the principal festivals celebrated in them. The monarch, too, as in the course of history he became more imposing and divine, demanded more careful and elaborate records of his life and reign and deeds. His festivals had to be fixed by the astronomical calendar. All these occasions, therefore, which were an organic part of the whole social order, necessitated the continual and accurate observation of the heavens, and promoted the development of calculation and the invention of mechanical aids, such as the sun-dial and the clepsydra, in which the Babylonians appear to have made the most advance. It was they who divided the circle of the heaven into 360 degrees, and the day and hour into the parts we still employ. The choice of these numbers involves a knowledge of the advantages of the duodecimal as well as the decimal system of numeration. In Egypt the latter was the basis, though their methods of calculation appear to us now intolerably cumbrous.

Great as were these services of the old theocracies in the beginnings of measurement and calculation, perhaps our alphabetic writing, which we also owe to them, was a still greater debt. It emerges in recognizable form at about the beginning of the last millennium, an example of simplicity won after centuries of complicated and competing signs and scripts. The point in history at which this was achieved was, as we shall see, near the time at which the spirit of the Greeks was to break through the old fetters of custom and superstition. It is a memorable fact that the rock-hewn inscriptions, high

above the ground at Persepolis, which first aroused the interest of scholars a hundred years ago and led to the deciphering of cuneiform, commemorated the kings of that widest, but least organic of the theocratic empires, which the Greeks challenged in their immortal struggle for national existence. This decipherment, carried on in parallel lines for cuneiform and Egyptian, revealed far more than the mere meaning of the texts. The prodigies of toil and ingenuity which the complexities of the problem evoked were rewarded by the confirmation of many old truths, by the discovery of many new ones, by the re-creation of a world of thought and action, such as the one column of Hammurabi's laws in the Louvre Museum, is sufficient, when interpreted, to establish. The two scripts were closely similar in their origin, yet in their diverse history they grew to be a perfect symbol of the whole circumstances and character of the civilization from which they sprang, and which they held together. The Egyptian preserved more faithfully the marks of its birth, and remained, like the people, more secluded in its original home. The cuneiform passed over a wider area, and was more worn away and altered by the various nations which adopted it. At the time when, in Hammurabi's column, it was used to express the central document of Babylonian social order in 2000 B.C., it was also passing, in correspondence, over Armenia and Asia Minor and even into Upper Egypt itself. The Egyptian script also shows best the pictorial origin of writing, and is at the same time the most complex, for it employed at once signs at all stages of their evolution, the picture of the thing, the conventionalized

picture for the syllable, and the mere letter or distinguishing mark. Both systems bear evidence of their religious origin, just as the Greeks had noticed their religious use in the hands of the priests. The earliest hieroglyphs were probably symbols of fetishes, pictures of planets, birds, snakes, &c., drawn for the purposes of magic or religion.

Before the scene changes from this slow-moving culture of the Nile and Mesopotamia to the quick life of Ionia and Hellas, another source of progress must be noted, closer akin to the theocratic system, but one which did not bear its full fruit till later in history. As the Greeks were settling in the lands surrounding the Aegean, another set of tribes, of Semitic birth, travelling in the region between the two great river-basins, began also to occupy the narrow strip of territory which was to be associated with their fame. Each nation had one of the narrowest and hardest areas of the Mediterranean basin for its national birth; each was to play a decisive part in the history of the world. Each had been long in contact with the ancient systems which it was destined to supersede; each had a new element to communicate to human thought which would in the end transform it and embrace the world.

The faith of Judaea has now, through its great book, become a light for us to many of the recesses of the ancient story. It was then a glow, small but intense, hidden under the colossal forms of decadent empires. It did not break out and kindle the West until Greece and Rome had done their preliminary work.

4

THE GREEKS

Primum Graius homo . . .
Irritat animi virtutem, confringere ut arcta
Naturae primus portarum claustra cupiret.

LUCRETIUS

We noticed in the last chapter many striking coincidences in culture, and two striking coincidences in date. At about the same period, towards the end of the fifth millennium B.C., the two great river-valley civilizations which speak to us through Egyptian hieroglyphics and Sumerian cuneiform, appeared in clearly ordered and definite shape. And towards the end of the second millennium B.C. the migrations and settlements of the Jewish and Hellenic tribes took place, which contained, both in their likeness and unlikeness, so many germs of life, full of moment for human progress. The parallel of the two national movements has exercised a powerful fascination on the philosophic mind reflecting on history. For Renan there were two objects worthy of lifelong study and exposition, the evolution of the Jews and of the Greeks. Having given one life to the former, he longed for a second to devote to the latter. In England we are familiar with the elaborate contrast between the Hellenic and the Hebraic elements which Matthew Arnold traced in modern life and thought. In the field of literature comparative studies have been made of the Hebrew sagas and the Homeric poems with illuminating results. At every point the parallel, and the contrast, teem with suggestion, which is not, however, germane to our present argument. The special contribution of the Hebrew genius to human thought, though it appeared in curious simultaneity with that of Greece, did not enter the main stream of progress till some time later. This last millennium B.C. is the age of Greece. At its beginning we

see the Greek race and language and ideas slowly emerging from the welter of wandering tribes and fighting barbarism; at its conclusion the foundations of science and art and civilization, firmly laid on the broad lines where they have rested ever since, had been adopted, enclosed and fortified by the practical genius of Rome. Greece had then done her work; Rome was in the midst of hers, and the moral and religious spirit, due originally to the Hebrew prophets, found a spacious and well-defended world for its expansion.

The millennium of Greece must be regarded therefore as the turning-point in Western history, and, through the West, of all the world. It is of supreme importance and unique, in three respects, of what it ends, of what it achieves, of what it leads to. It ends the old primaeval rule of tradition and authority. It achieves the most beautiful and perfect creations in language and plastic art which the world has seen, and within the shortest time ever known for such an evolution. It leads directly to the formation of modern science and the civilized system in which we live: it is the decisive step in the advance of man's power over nature.

The Greeks were a branch of that Aryan or Indo-Germanic group of peoples to which we ourselves belong. Amid the cloud of myth and conjecture in which the primitive history of the group is surrounded, one point stands out firm and clear: all branches of it use a speech, similar in its structure, similar in its commonest and oldest words; identical therefore, so far as we can judge, in its beginnings. They were all more northerly people than those we have hitherto mentioned—the Egyptians, the

Chaldaeans, the Hittites, the Jews—and covered a long stretch of land from northern India to southern Russia. The Greeks did not call themselves by that name, which they acquired much later in their settlements in southern Italy. They had, in fact, no common name until the seventh century B. C., when they adopted the name 'Hellenes', and referred its origin to a mythical ancestor of all their tribes, called Hellen, just as the Jews called themselves the sons of Israel. When the migrating tribes of the Hellenes first appear in the dawn of history, streaming from the north and covering gradually the lands and islands of the Aegean, they come as Achaians, Dorians, Aeolians, Ionians, and many more. Each name has its own story, the heroes of the earliest legends and lays being often imaginary figures, personifying the tribes, just as Hellen was later on adopted as the original ancestor of the whole race, with its four main branches as his sons. How far they found in these Aegean lands, in Crete, in Attica or elsewhere, men akin to themselves in blood or speech, we shall not here inquire. It seems probable enough, both in this and other floodings of prehistoric lands by the tumultuous waves of migrant barbarism. For our present purpose historic Greece, the Greece which has formed the thought and civilization of the Western world, dates its rise from after the time when these migrations from the north had settled down; and we note that in a thousand ways historic Greece looks back to those northern lands where, at Dodona, they had their oldest shrine, and on Mount Olympus the family home of their official gods.

The lands thus overrun between the second and the

last millennium B.C. contributed, by their own conformation, no small share to the direction which the evolution of their invaders was to take. They contain the largest amount of sea-coast in proportion to area which you could find anywhere in the world. The coast throughout is broken up by innumerable inlets both large and small, and the archipelago is so closely studded with islands that small boats can pass with ease from one to another on a summer's afternoon, never out of sight of land. The land itself is by no means fertile, and intersected within by mountains as the coast is by sea. But for the artist, for all to whom clear impressions are of value, it has a quality of colour and of sharp-cut outlines, of mountain against sky and land against sea, unique in Europe if not in the whole world. In the general trend of its communications it is important to observe that the whole peninsula, with its main inlets and its fringe of connecting islands, looks towards the east, just as markedly as the Italian peninsula looks towards the west. So the northern settlers were led on into contact, both peaceful and hostile, with the peoples of the East.

These geographical factors played their part in the historic evolution, here as elsewhere. They are here very clearly marked, but that they were the main determinants of Greek life and thought we cannot say. We note them only, and note also that, in the sequel, the Greeks descending from an inland stock, where as yet no common word for a ship had been in use, became in their new surroundings a seafaring and a trading people. The 'wet ways of the sea' became their highroads and knit their world together, as paved roads did the Roman Empire.

There were no paved roads in Greece. The largest political union which Greece in her days of freedom succeeded for one short moment in holding together, was the Athenian empire, a maritime league which took the place of one which had grown up in the early centuries of the millennium round Delos, the little central island of the Aegean, market and forum and holy place for Greek traders and travellers, especially of the Ionian branch.

This maritime expansion is the capital fact in the first third of their millennium. By the seventh century their lands are settled; they have sent out their colonies east and west; they have come in close touch with their neighbours and are learning from them. The middle third of the millennium is the time of mental expansion and the climax of the national life. They have the national poems of Homer nearly in their finished shape. They fight and defeat the Persians. They face the problems of the world as free and reasonable men: abstract science and philosophy begin and their art receives its perfect form. The last third is the period of review: their ideas are absorbed and permeate the world, while their own national spirit and initiative decline and die away.

The first division of the Greek period cannot here be more than mentioned. Essential as its study is for the comprehension of Greek civilization as a whole, we are in this sketch attempting something different. We are trying roughly and very briefly to piece together, at the places where they join, the main sections of that line of human progress which has led to our present Western

civilization, especially in its aspect of a collective triumph over natural forces. In this process the Greeks played a leading part, but they did not appear as leaders until they had emerged from their state of northern migratory tribes, had met the more advanced peoples of the East, and had learnt what they had to teach. For in their wander-years they were as far behind the Egyptians, Babylonians or Phoenicians in culture or achievements as were the northern barbarians on the fringe of the Roman Empire. Nothing is more significant of this than the comparative lateness of the use of writing among the Greeks. Egyptians and Cretans had been for ages using it, and able to teach the Greeks at the time when their traditional lays were being handed on from mouth to mouth. But they appear finally to have adopted, with ingenious modifications, the alphabet in a Phoenician form, from those rival traders whose path they crossed in the Aegean and whom they were to supplant as chief merchants and channels of communication in the Mediterranean world. Hardly any Greek inscriptions date from before the seventh century, when their intellectual leadership begins.

The Homeric poems are the most precious relic of this earlier period, though they were being altered and edited well into the centuries of the zenith, when Athens had become the centre and leader of Greek life and thought. It is this continuous tradition and rehandling which make Homer a document of such supreme value for history as well as literature. We have in it the background of the older civilization of the Aegean, with its highly developed order and its marvellous art, as revealed

in the diggings at Troy and Mycenae and, above all, in Crete. And in front of this background the Greeks of the migration carry on the action of the piece in the full vigour of barbarous life, while everywhere details of their later life and touches of more developed thought remind us of the process of revision. This epic, more than any other, grew up with the people which gave it birth, born from the heart of their being and fed by their life-blood.

Think of the circumstances which called the poems forth, the round of festivals and public gatherings which the wandering minstrels visited, where the lays, treasured up and constantly revised and added to by the schools of singers, were submitted afresh to the applause and criticism of eager men, full of their local and personal ambitions, in close touch with all the interests of that young and thriving world, ready to respond to any touch of fire or pathos or beauty. It was this open, common public of sympathetic minds which made possible an art of winged words, and shaped and polished them to the general taste. No doubt, too, it was this environment of their birth which gave point and vigour to the latent idea in the poems, that the Greeks are the advance-guard of a newer civilization assailing the forces of an older and lower world. For Homer first strikes the key-note of that conflict of West with East which held the mind of the Greeks throughout. The tribal conflicts enshrined in the legends of the Trojan war become the first moving of the national spirit in its destined strife. The Persian war is the later true epic on the same theme, and it lasts all through the Greek centuries until the conquests of Alexander stretch it to breaking-point, and with the advent of the Romans a greater Western power

appears, which absorbs and converts to new ends the achievements of the Greeks.

It was to an Ionian public that the Homeric poems were addressed, and it was in Ionia that the great outburst of Greek intellectual genius took place in the seventh and sixth centuries B.C., at the beginning, that is, of their central period, the turning-point of human history. It is another significant coincidence in chronology that this point corresponds closely with the age of the Jewish prophets, who first enunciated that system of morality based on religion, which in its later development has encircled the globe. Their teaching, especially that of Isaiah, Jeremiah, and Job, on the problems of suffering and the purification of life, will always form an arresting companion study to that of the Greeks, whom we are here considering at more length.

Ionia is primarily that sea-coast fringe of Asia Minor where the immigrant Greeks had settled, and where they came in contact, both round the coast and over the inland plateau, with the older and wealthier civilizations of the nearer East. To all these people the Ionians were the Greeks, the Iawan of Eastern literature. The Lydians were their nearest neighbours; behind lay Phrygian highlands and the old trade routes leading on to Babylonia; and round the coast Greek ships would sail to Cyprus, meet the Phoenicians in their own sphere of influence, and reach Egypt without crossing the open sea. From this sea-coast many of the islands were settled, and some have held that the settlement of the Greek mainland itself was by a reflux tide of immigration, which had first passed into Asia Minor by the narrowest seaway, across the Bosphorus. Here, at any rate at this period, was the scene of the most intense life in the

Greek world. It was the centre of commerce, as well as the birthplace of science, and the two went hand in hand. Thales, the first name in Greek philosophy, was active in both; he used his astronomy for the good of seafarers as well as for the building of science. By the end of the seventh century the Greeks of Ionia had become the leading traders of the Mediterranean : they had distanced their Phoenician rivals and learnt their secrets : they had a settlement in Egypt and were on friendly terms with the new Egyptian monarchy, which had lately established itself in the Delta, and they were in alliance with the active Lydian monarchs, whose dominions touched, and in some places included, the Ionian settlements on the central sea-coast of Asia Minor. Just here, where Greeks and Lydians were in constant intercourse, and just at this moment, before the advent of the first philosopher, another of the great practical inventions in human history made its appearance, the first coined money, which bears a Lydian stamp. It bespoke the need of a uniform, acceptable and easily transported, medium of exchange, in the busiest centre of commerce which the world had yet seen.

Of the twelve associated Ionian cities the most important was Miletus. It had already taken the lead in sending out its colonists east and west and north. It was to fire the train of the national rising against Persia later on. Its harbour, now sanded up and idle, was the central mart of the Ionian world, and sent out and received voyagers from every quarter. Of these Milesian travellers and merchants the most famous in the ancient world was Thales, the first of the philosophers, of that new type

of man who was to be the special organ of the Greek spirit.

Now it is essential, before we speak of any definite results, to realize what is implied by this term 'philosopher' when used of Thales and the early thinkers of Greece. In later ages and often in our own day the word 'philosophy' is carefully defined to exclude precisely those parts of the thinking of the early Greeks which proved to be of most permanent value; and this definition, when carried back into the period when 'philosophy' was understood in a larger sense, has led to the presentation of a singularly mutilated picture of early Greek thought in most of the so-called 'histories of philosophy'. The crude speculations about the origin and nature of things in general, interesting as they are as evidence of the new spirit of free inquiry, and not without occasional flashes of brilliant insight, were necessarily premature and bound to be superseded by fuller knowledge. These are presented to us as the main results of the thinking of Thales or Pythagoras, while their solid achievements in the history of thought are passed over as belonging to another department called 'science'. The early thinker knew no such distinction, and we are bound also to treat his work as a whole—'science' and 'philosophy'—and to consider it as an integral part of the development which was going on simultaneously in all parts of the Greek domain, commerce, art, philosophy, and politics.

The Sophos or Wise Man, as the new type of hero was first called, was a person of intellect above his fellows, who applied his mind freely to the facts of the

world around him, not without the guidance of others, but without subservience to tradition or authority, and anxious to use his knowledge for the common good. Such was the Thales of the legend, such was Herodotus later on, as his own history reveals him. Thales was the chief of the 'Seven Wise Men' of Ionia, as his city Miletus was the chief of the twelve Ionian cities. The story attributes to him wisdom of every kind. He advised his fellow-citizens to form a closer political union among the Greek states of Ionia to resist aggression when the day came. But this form of wisdom it was always most difficult and finally impossible for the Greeks to practise. Of speculative wisdom, whatever his actual personal achievement may have been, he was the acknowledged pioneer. He was regarded as the founder both of general philosophy and of the abstract sciences of astronomy and geometry. But the alleged facts of these theories and discoveries are slender; that he found in water the origin of things, that he predicted the solar eclipse of 585 B.C., that he discovered some half a dozen geometrical truths. The particulars in each case rest on scattered statements in various authors of much later date. It is impossible therefore to reconstruct a personal history. There is less chance, in fact, of ever knowing what the personal Thales did for science than of disentangling the supreme and fundamental poem in the *Iliad*. But as in so many cases what we really know is the most important part of the story: and these points appear certain. There had appeared by the end of the seventh century B.C. a new type of mind among the most advanced of the Greeks, the Ionians of Asia Minor, the

man who by dint of travel and comparing his own observations with what he heard from others, arrived at new conclusions which sometimes proved to be great general truths, widening out into floods of light over facts hitherto mistaken or unexplored. Thales was one of these, who succeeded in thinking out more than his fellows, or in making a greater personal mark on his contemporaries. He travelled, as all such men would travel, in the land of the oldest culture and deepest learning which they knew, and in Egypt studied what the priests had to teach in medicine, in astronomy, and in geometry. That more discoveries are ascribed to him in geometry than in any other branch, agrees perfectly with all the other evidence, and with the very nature of exact science. No real progress could be made in scientific astronomy or physics until a foundation had been laid in mathematics, and into mathematics, and through mathematics into the whole realm of exact science, 'no one could enter who could not geometrise'.

Here then at the threshold stands the inquiring Greek, and no man can say how much in that first crucial step was due to the Egyptian teacher, how much to the quicker-witted learner, who was to carry out the new and deeper conclusion into the world and help to build up a structure of thought, of which there is certainly no trace before the Greeks.

It has been supposed that the first theorem in geometry —which was attributed to Thales—was an observation based on the drawing of squares in circles which had been a common feature for ages in Egyptian ornament, as no doubt elsewhere. A reflective mind observing the

identity of the angle in the many positions in which the square would be drawn could, one would think, in the end not resist the conclusion that the 'angle in a semi-circle is a right-angle'. Obvious as it seems when once observed, the observers and the draughtsmen of ages had avoided the conclusion, or rather had never formulated in exact and general terms the truth which must have been implicit in their minds. It was this exact and general statement of a true relation which constituted the beginning of abstract science. It was a momentous step, one of the great turning-points in history, and due entirely, so far as our knowledge goes, to the contact of the new, vigorous, and inquiring spirit of the Greeks with the old learning and art of the settled communities of the East, especially of Egypt. But new and important as it was, it concerns our general belief in the continuity of human progress to consider how closely it followed the line of thought linked with action, which we traced from the time of the first maker of a tool onwards. Language itself was, as we saw, the first expression of a general observation, when the earliest hunters accepted some common sounds to indicate the objects and actions of the chase. So, when man came to name the circle, he had already perceived in a vague, unanalysed way the common quality of perfect roundness. We cannot believe that any animal has this perception, and the lowest savage has certainly not expressed it. The next step comes when the drawing of the circle elicits the latent knowledge of its most obvious property, that the circumference is the locus of all the points touched by the end of a string or stick revolving round the centre. So far pre-scientific

man had gone : the first theorem of Thales is but another step in the analysis. The perception itself of the right angle in the semicircle does not appear much more difficult than that of the equality of the radii : its wider scope arises from its formulation in exact and general terms, and from the circumstance that the observation brings together two distinct classes of figures, triangles and circles, and sets up a universal relation between them.

This one theorem must serve as a type : it would only distract attention from the main thread of our sketch to multiply examples. The other philosophers of the time, many no doubt who are not recorded, were engaged in similar discoveries and speculations. Most of them contributed some thoughts to astronomy or mathematics : all of them theorized freely about the origin and nature of the unknown universe, without regard to previous theological or mythological beliefs. This was the new temper which was rising among the Greeks, and these two aspects of it are to be traced together throughout—the one boldly critical and sceptical towards current dogma, the other tentative, but steadily constructive of new truths. And side by side with the abstract speculations of the philosophers there was going on, through seafaring and the widening relations of commerce, a real enlargement of the world's horizon, not unlike that which two thousand years later accompanied the Renascence, with similar results on men's minds.

But one school of sixth-century philosophers stands out above all the rest. The Pythagoreans were indeed much more than a school of philosophers. They were a brotherhood on a moral and religious basis, which

for some time had a great political influence among the Greek states of southern Italy. Their founder was an Ionian, but of Samos, the rival state to Miletus. The island of Samos lies across the entrance to the gulf of Miletus, and commands its harbour. There was naturally incessant rivalry and feud, and the Samians were always allied with the Dorian cities of the mainland, Corinth and Sparta, in their struggles with the Ionians. There was possibly some Dorian blood in Samos; at any rate their Dorian affinities are worth remembering when we consider the general character of the Pythagorean system. For the Dorians, especially at Sparta, stood for the harder side of the Greek character, for conservatism and rigid discipline and self-repression. And the teaching of Pythagoras leant on one side so much in the direction of the old religious doctrines that there was some confusion between the writings of his school and those of the Orphic adepts, the leading mystic sect. In any case Pythagoras was clearly concerned above all with the direction of life, and regarded his scientific speculations as subordinate to that end. As a general discipline however the doctrine had no sufficient basis, either in theory or the facts of the time, and was doomed to failure, though full of fine and inspiring thoughts, anticipating the Stoics; while as a contribution to the growing body of scientific truth, the teaching of the school was the most considerable before the great age of Athens. The social discipline had little scope beyond the limits of the brotherhood, and that was soon dissolved, but, as a means of stimulating their scientific studies, it must have had for the time

a powerful influence. It brought into science that co-operative spirit, tempered by public action and criticism, which we saw at work in the rise of the epic. The story was that Pythagoras, who had been born at Samos about the year of Thales' eclipse of the sun, 585 B.C., was driven away from his native town by the tyranny of Polycrates, when he was between fifty and sixty years of age. He had already travelled and absorbed what the old schools of Egypt and the East, and the new philosophers of Ionia had to teach. He must already have matured his system and made his mark. He migrated, after his expulsion, to Crotona, a Dorian city in southern Italy, and there the foundation of his brotherhood and his active career took place. The order was dispersed by the middle of the next century, but before that time they had put together most of the geometrical truths which were current in the time of Plato and are preserved to us in Euclid. The fact is so easily stated that its magnitude is likely to escape us. This body of mathematical truth remained the bulk of what men had thought out on the subject until after the Middle Ages, until in fact the new analysis of Descartes and the calculus of Newton and Leibnitz. It contained far more than the elementary geometry now learned in schools, for there was as well a good deal which we now regard as part of advanced arithmetic, the theory of proportion and of the properties of numbers, besides the beginnings of solid geometry and the discovery of incommensurable quantities. The result of this hundred years of early Greek thinking was the mental discipline of the Western mind up to our own time, and the fixed keystone of all exact science. What

most hindered the immediate application of the results to practical uses, and the extension of the powers of calculation which has taken place in recent centuries, was the want of a convenient system of numeration. Even for an alphabetic system men had to wait for the Greeks of Alexandria, and for the little, all-important device of the cipher, until the Arabs introduced it from India in the Middle Ages. These were the happy thoughts of smaller men, which made the machine work smoothly. The great construction had been done by Greeks in their prime and very largely by the school of Pythagoras. It was said many years later, that in the time of their troubles, 'when they had lost their money,' the Pythagoreans decided to publish their geometry in a book which was called *The Tradition about Pythagoras*. The story fits the case so well and is so interesting, that one would like to be allowed to believe it. It shows us the brotherhood treasuring as their most valued possession that part of the master's teaching which was to prove his best, and doubtless adding to it so long as they held together. It would fix the date of publication towards the end of the first half of the fifth century B.C., when the wars in southern Italy, which broke up the school, had reached a climax. The wealth and glory of Athens were then attracting the intellect of the world, and 'philosophy' itself began to find a price. The same city would soon receive the first great book of science, which had but lately seen the final edition of the first great epic.

Of the other teachings of Pythagoras less need be said, for, where they were not purely mystical, they had more

the character of brilliant guesses and less of verified truths. The predominant influence of numbers in the universe, which was a leading tenet of the school, while it led to much extravagant hypothesis, suggested also some pregnant truths. They saw, for instance, that the different pitch of musical notes followed a numerical relation between the length of the strings. In astronomy their contributions were striking, though less exact or firmly based. They were the first thinkers on record to have conceived the earth as a globe, revolving with the other planets round a central fire. Not only the moon but the sun also shone by reflected light from this central source. Copernicus stated that this theory first suggested to him the true explanation of planetary movement.

The paths of poetry and of philosophy lead us to Athens and to the beginning of the fifth century B.C.: art and politics tend to the same point, though we shall here only indicate the convergence. At the same time that men's minds were stirring towards free inquiry into the causes and nature of things around them, they began to claim their due share in ordering their own lives and governing the communities to which they belonged. The two impulses spring from the same or kindred roots, and though we find from time to time a free philosophy flourishing under tyrannical or alien rule, in the long run the two are incompatible. Greece was approaching in the sixth century the greatest of the crucial instances in history. The Greeks of the earlier period had, like the Homeric tribes, been ruled by kings. It was under kings that they had settled the lands of the Aegean and founded their city-states. The city-state, or polis,

enclosed by its wall, was the greatest contribution of the Greeks to the practice and theory of government, and it arose in monarchical times from the grouping of a number of villages together for purposes of defence. But though due to kings and probably in its origin impossible without them, such a state tends invariably to a popular form of government. By the seventh century the kingship had almost universally disappeared, except for certain titular or ceremonial posts, and the only real question in debate was the extent and the form of popular control. The rule of the nobles followed normally that of the kings, but during the century in which we have traced the rise of philosophy, there was a general movement towards extending and equalizing the rights of the whole people. Athens was to see the democratic principle carried to its furthest point; but before this was reached she passed through certain changes which have a bearing on our general argument.

In Athens, as elsewhere, the early monarchy had been replaced by an aristocracy before the seventh century, and by the end of that century the commonalty were feeling in an acute way some of the effects of the new movement in the Greek world. Economically, they were enslaved by debt and by the accumulation of land in the hands of the few rich: politically, they were no longer willing to leave all power, judicial as well as executive, in the keeping of a small aristocratic class. At this point one of the noblest figures of antiquity appeared in Athens—Solon, himself belonging to the aristocracy, but compelled by his father's impoverishment to travel and trade abroad. Many stories are told of his sayings

and doings in Ionia, in Lydia, in Egypt, and further east. He was a leading example of the early Sophos, and was included among the famous Seven. But in his case the conditions in Athens and his personal position there enabled him to carry his wisdom into practice. In middle life, having done certain external services to his native city, he was empowered to carry out a scheme of reform, economic as well as constitutional, which laid the foundation of the later commercial prosperity and popular government of Athens. The details are obscure and disputed, but the net result was the abolition of the weight of debt, a large increase in the number of freeholders, and the inclusion of a popular element into the membership of the assembly and of a newly-formed law court. A change in the system of weights and measures was made, which facilitated Ionian trade: and so the Sophos, experienced in the wisdom and travel of the East, became a fresh link between Athens and the Ionian world, and a source of social and political equality, as well as enlightenment, to his native city.

The sixth century in Athens, as well as in many other Greek states, saw the rise and fall of a number of rulers called ' tyrants ', who relied usually upon popular support as against the old aristocracies. Peisistratus and his sons, who followed Solon in Athens, were some of them, and did a great deal to further the interests of the city in art as well as in commerce. These ' tyrants ' largely modelled themselves on the example of the progressive Lydian monarchs, who had for many years been on friendly terms with the Greeks, and consulted the Greek oracles. But like everything political in Greece, the ' tyrants ' had an unstable

seat, and when Croesus, the last of the Lydian monarchs, was swept away by the advancing tide from Persia, the Greek 'tyrannies' in most cases soon followed. Just before the crucial impact of East and West at the beginning of the fifth century, Athens, after dismissing her 'tyrants', took a long step further towards democracy. When the moment arrived, she was the unquestioned leader in the national struggle, and she was the state which had made the boldest experiments in governing herself.

Step by step with the growing freedom which we have traced in Greece—freedom and new construction in thought, freedom and experiment in government, the largest, but the least stable, of the empires on the old theocratic basis was being built up round the warlike tribes of the Persians. It was inevitable that some such power should erect itself on the weakened remnants of the Eastern kingdoms. Cyrus, who determined the leadership in favour of the Persians, was a wise and tolerant ruler as well as a successful commander. The state he founded and organized had extended itself before the end of the sixth century over Assyria, Babylon, Syria, Phoenicia, Egypt, Lydia, and all Asia Minor. It was in touch with the Greek states of the sea-fringe and had stretched out a hand over some of the islands. It was the greatest portent in government which the Greeks—or indeed the whole world—had yet seen. For a time most of them bowed the head. But the Great King at Susa seemed immeasurably remote, and it was found that at close quarters the well-armed and compact phalanx of the Greeks could bear down a much larger number of the archers and lighter-armed men from the East. The first outbreak was on a local quarrel at Miletus. Even

here at the first challenge, and before the magnitude of the final issues had been thought out, the Athenians did not hesitate to enter the fray. They marched up with the Milesians and burnt Sardes, once the Lydian capital, now a local centre of the Persian rule. This was in 498 B.C., two years within the century which was to see Greek power and intellect at its height, with Athens at the head. The burning of Sardes was but a signal and an incident. The citadel never fell, and the Greek force, as they marched back to the coast, were overtaken and defeated. The revolt was crushed, but the Athenians became marked men.

The immortal story which follows was handed on, and adorned at every point, by the nation of the most gifted story-tellers who have ever lived. It inspired the ' father of history '. It was sung by two of the greatest of Greek poets, one of whom played his part in the greatest of the battles. It was the critical stage in the salvation of the Greek spirit of freedom from a levelling and deadening hand which would have hindered for ages, if not killed, the new life which had to flow unchecked in the veins of the leading stock in the human family before man's command and unification of the world could effectually begin. As landmarks in this movement the names of Marathon and Salamis, of Miltiades and Themistocles, hold their place for ever. To the Greeks of the time it was a terrifying moment, and their success appeared the most marvellous event which had ever happened, the gift of the gods. We, who know the sequel, can see even greater issues, of a kind and scope transcending altogether the outlook of contemporaries, and may well tremble when at so many turns in the story the action seems to depend on

one man's vote or one man's defection, some clever trick or casual fatality. Such appearances are often the illusion of distance, or the exaggeration of romance. But in the case of Greece there was always a fundamental uncertainty in the fatal disunion of the cities, and the frequent instability of public men. At the height of the crisis many Greek states were found on the side of the enemy, and the union between Athens and Sparta, to which the final success was due, hardly survived the home-coming of the armies. Yet it was the golden opportunity for union. Athens had been the moving spirit in the defence. They had first taken up the challenge and at Marathon had shown the Greeks how to win. In the interval between the campaigns, by following Themistocles and building the fleet, they had prepared for Salamis. In the decisive campaign, though Sparta had led by land, Athens had sacrificed her temples and her homes. But the opportunity was thrown away. Sparta refused the overtures of Athens, and Athens, after a short attempt at conciliation, preferred the path of aggrandizement and empire.

It was left then to Athens alone to exhibit to the world the most brilliant fruits of the triumph of free allied states over ill-compacted and reactionary despotism : she had assuredly the best means of feeling and expressing what it meant. Pindar and Aeschylus are the contemporary voices. Pindar, though a native of the hostile town of Thebes, glorifies Athens as the ' brilliant, violet-crowned and famous city, the support of Hellas', . . . ' the city whose sons have laid the shining foundation of freedom '. And Aeschylus, who fought at Salamis, and has given us in the ' Persae ' a document unique in history, a contemporary play describing one of the

decisive battles of the world, by one of the greatest of poets, who himself took part in it, speaks of his fellow-citizens as men who had 'never been called the subjects or the slaves of any one'.

The war brought splendour to Athens, and fifty years of empire; but the lasting result for mankind was something deeper. It focussed in Athens, a more central point for the whole Greek world than Ionia had been, all the light in art, science, philosophy, and literature that had been growing for two hundred years. Athens became the acknowledged intellectual leader, the meeting-place for philosophers, the school of learning and of teaching, which, though eclipsed later on by Alexandria, continued for nearly a thousand years. The men who left their homes in 480 B. C. to be burnt by the Persians were founding the first and greatest of all universities.

The outward sign was the rebuilding of the city in all the glory and beauty which the greatest school of Greek architects and sculptors could devise. The Parthenon, the city's central shrine for Athena, its patron goddess, became in its new form the most perfect building, most beautifully adorned with sculpture, which the world has ever seen. The material basis was the wealth of the maritime federation which Athens had now grouped round her: the informing spirit was the genius of Greek art, which had been gathering strength and shape for two hundred years and had now found its outlet: the executive hand was Pericles, who sums up for us the knowledge and power of Athens in her prime.

He held his place in the city by the direct will of the people, a result of the rapid growth of democratic government since the 'tyrants' were dismissed, above all since

the outbreak of war with Persia. Themistocles had built his fleet and won Salamis by throwing himself on the support of the whole people. Pericles in the same way depended on his power of moving the popular assembly. By this time all the old 'archonships', and the smaller offices as well, were filled by lot in accordance with the democratic theory of the day. The post of one 'Strategos', or general, was still reserved for election. This Pericles held, and by maintaining his hold on the assembly, he became the popular dictator, persuading the people and expressing their will, forming their decisions and enforcing them, from day to day. The Funeral Oration, which Thucydides puts into his mouth, is the best example of how this subtle process was accomplished in the hands of its greatest master. In such a speech Pericles partly interpreted the feelings of those around him, partly suggested to them the unique value, the higher implicit purpose of the life they were living, and of the city they were building around them. He idealized it to them as the model of splendour and moderation, just as the poets and artists were idealizing their gods and legends in stone and verse. Pheidias, the sculptor of the Parthenon, put the figure of Pericles on the very shield of the goddess in her inmost shrine; Sophocles, the poet, was his friend, and from Anaxagoras, then settled in Athens, he learnt the rationalizing and liberating philosophy of Ionia. Such teaching as that of Anaxagoras agreed perfectly with his own sense of harmony and self-restraint, and produced a character which could claim at the last as its highest merit that 'through Pericles no Athenian citizen had been made to mourn'.

This alliance at Athens, in the person of Pericles, of the most advanced thought with the strongest political force and centre of democracy in Hellas, was the capital fact of the fifth century B.C. Hitherto the Ionian cities in Asia Minor and the Pythagoreans in the west had stood for the vanguard of thought. Now Athens became the centre, and Anaxagoras, not himself one of the greatest founders, gained through this fact a leading influence. He was interested in mathematics and astronomy, and introduced into the physical speculations of the Ionians the new idea of an element called 'Mind', which, moving about among the particles of other kinds, might in the course of ages reduce them to order; clearly an inspiring thought, rather of moral than of scientific value, less based in fact, less suggestive of scientific conclusions than the atomic theory which the greater Democritus, his junior by some thirty or forty years, handed on to Epicurus, Lucretius, and the modern world. But Anaxagoras contributed more to the intellectual growth of Athens, for, calm and disinterested like all the greatest of the Greek teachers, he used his powers and his philosophy of reason to free his pupils from the terrors of superstition, and to give them 'a religion of peace and good hope'. Such teaching, like that of Socrates later on, was suspect to the crowd of Athens, and only Pericles could save him from a sentence of death. The whole story is full of suggestion, most of all, perhaps, of the conservative religious mind of the Athenian people, and of the distance which still separated the mass from those whom we are bound to regard as the mouthpiece of the best thought of the age.

So it is that those, like the artists of the Parthenon or dramatists like Sophocles, who were acceptable to the whole people, did not attempt to question or destroy the old beliefs, but only to raise and purify them. In their work the accepted legends and divine figures remain, idealized by the new spirit of beauty which, with the spirit of abstract and general truth, makes up the genius of Greece.

For the first time in the world's history men had become conscious of their own gifts and powers, and were endowed richly with the means of expressing their consciousness. At the end of a period of awakening thought had come a stroke of the most marvellous and successful action. Those who had stood for free, strong manhood had trampled on the mass of lower and invading force which had threatened to overwhelm it. Their exultation was immeasurable, but they did not desert the home where their hearts were rooted, nor the gods who had assisted in the triumph and would share the joys. The artists of the Parthenon and dramatists like Aeschylus and Sophocles represent this position perfectly, the attitude of the Greek spirit at its zenith. They maintain and transfigure the old religion with all the arts and in the full light of a new day. The gods become the strongest and most beautiful forms of men, unlike the primitive gods of nature or the grotesque animal forms and planetary forces of the theocracies. And in the midst of the glory of the Periclean age we have from Sophocles a paean of human power in the famous chorus of the *Antigone* which might well be taken as the motto for the whole Greek movement: 'Of all strong things none is more wonderfully strong than Man. He can cross the wintry sea, and year by

year compels with his plough the unwearied strength of Earth, the oldest of the immortal gods. He seizes for his prey the aery birds and teeming fishes, and with his wit has tamed the mountain-ranging beasts, the long-maned horses and the tireless bull. Language is his, and wind-swift thought and city-founding mind ; and he has learnt to shelter himself from cold and piercing rain : and has devices to meet every ill, but Death alone. Even for desperate sickness he has a cure, and with his boundless skill he moves on, sometimes to evil, but then again to good.'

No one before the Greeks could have said that ; no one since the Greeks has said it with the same simplicity and confidence. It is indeed more than two thousand years before we find another utterance at all comparable. Shakespeare recalls it and, in the fuller light of modern science, Shelley, in the ' Song of the Earth ' in *Prometheus Unbound*. A comparison of the modern with the ancient poet is singularly instructive, the new thoughts in Shelley being as striking as the old, and marking several stages which the human mind had traversed in the interval. One point is specially relevant here and throws light on the general intellectual state of this mid-fifth century B. C. in Athens. The nineteenth-century poet lays most stress on the power of collective human thought in penetrating the secrets of the universe : Sophocles dwells from first to last on man's practical skill in the arts of life. It was this side which naturally first impressed man's mind when he became self-conscious ; it was also the aspect of intellectual activity most prominent in Athens at the time of her expansion.

The greatest steps in abstract science were not made at

this time, although it was the age of the widest popularization of knowledge and the testing of new ideas. The leading mathematicians were Pythagoreans, enlarging, editing, and expounding the achievements of the school. Physics and astronomy were still in the stage of conjecture, while the large schemes of the origin and development of things, promulgated by the Ionians, were beginning to be met by criticism and denial. But descriptions and practical studies began to abound, and the concrete results of art and science and persevering effort were dazzlingly evident. The Parthenon was there, showing the utmost delicacy and skill in its construction and a knowledge of curves, of which the full properties could not yet have been theoretically explored. Sculpture, too, admitted to be unsurpassed and unsurpassable, not only in its execution, but in the knowledge of anatomy, which makes the head of a horse, as well as the human figure, a living, breathing thing. We are prepared for the appearance at about the same time of the first great name in medical science, Hippocrates of Cos.

In medicine, as in geometry and astronomy, the Greeks had first gone to school to the priests, and here, too, they became pioneers of a new method, although their knowledge of the facts was never sufficient to put them on the same high level which they reached in the more deductive sciences. Hippocrates, who took the crucial step, was a pupil of Democritus, who in his theory of the atoms attained as much scientific truth as was possible in primitive physical speculations before the advent of verified experiment. To the scientific spirit of Democritus it was no doubt largely due that Hippocrates was able

to add to medicine a number of careful observations, and above all a notion of the action of the whole environment of the patient on his state of health. The titles of two of his works which survive indicate their method: *Prognostics*, meaning a forecast of the natural course which the disease would take; *Air, Water and Place*, indicating the three main factors which normally affect the health. In each case we have the beginnings of sound method at work amid the darkness which necessarily surrounded the functioning of the organs before Harvey's discovery, and when dissection was in itself an offence against the dead. Under such conditions the achievement of Hippocrates, definitely separating medicine from the old priestly tradition and assigning it to the realm of natural causes, was perhaps the most notable step in the science of the fifth century B.C.[1] His saying that the love of art, especially the art of healing, was after all identical with the love of man, may fitly stand beside the great chorus in Sophocles.

Another art, which arose and flourished at the same time, had no small share in determining the direction of philosophy. The profession of the Sophists enjoyed in later days an entirely evil fame, partly owing to its own perversion, partly to the highly-coloured picture which Plato gives of it, outraged by the fate of his master, Socrates. The Sophists appeared in the middle of the

[1] 'Men considered a matter to be "divine" on account of their inexperience and wonder that it was not like anything else' . . . 'So magicians and quacks alleged the divinity of this disease to cover up their want of skill. If the patient recovered, their charms and quack remedies were justified; if he died, their excuse was complete; they were not responsible, but the gods.' Hippocrates: 'On the Sacred Disease'. (Wilamowitz-Möllendorff, Greek Reading Book, 270–1.)

fifth century, prepared to give the youth of the leading cities the sort of higher education which the rising democracies demanded and the knowledge of the day could provide. The popular assemblies, which at Athens and elsewhere had become all-powerful, could be ruled by men who had acquired the gift of clear exposition and persuasive speech. Thus it was that a training in rhetoric, valuable in itself and leading to that perfect prose which was another feature of the age, was liable to uses dangerous to the state and pernicious to the user. Triumph and not truth tended to become the object of the Sophist's art. And the turn in the intellectual movement of the age gave a still more profound bias in the same direction. Just at the moment when a new interest in moral, social, and political questions was being aroused, there came a reaction against the physical and cosmic speculations which had flourished so richly in the early centuries. A deep unrest and scepticism set in on matters about which the first philosophers showed easy confidence. Perhaps after all there could be no truth about these general questions, and victory in argument was not merely the best, but the only way. Meanwhile men had to live and the city to be governed, and it was in this field of moral and political discussion that the Sophists and Socrates were alike engaged. The difference between these was rather in the spirit of the teacher. The Sophists were a professional class living, and often becoming rich, on their teaching. Socrates refused any payment and died because his method and doctrines offended too wide and powerful a public.

We noticed how the Greeks for the first time succeeded

in giving their gods a human form and character. It is still more striking that they are themselves the first real human beings in history. This fifth century, distinguished for so many things—for its new sense of pity and humanity in literature—is full of living men and women, acting and speaking, as we can imagine ourselves to see and hear them. Among them all we know Socrates far the best, the first figure in history whom we know intimately. For this we have to thank mainly the transcendent interest of his character, but also in no small degree the new prose writing, which from this time onward begins to come down to us in large quantities. Through all these circumstances we know Socrates better than many persons in our own recent history, far better, for instance, than Shakespeare : and with Socrates we know his circle, and feel that we might have joined in those conversations with the rest. Doubtless it is the great soul of the man—his single-heartedness and sympathy—which draws us to him as it drew his contemporaries, and created a world around him which is still alive. But he was also very really the child of his age, and carried out, to high purpose and with the insight of genius, a similar task to that of the Sophists. Like them expressing the tendency of the time, he gave his thoughts to social rather than physical questions, and roundly denounced inquiries which had not a direct bearing on human life. Like theirs, his method was oral questioning and speaking. But in the purpose and result of his teaching he achieved something which proved of decisive value for the maturity of Greek thought, and hence for all time. His questioning aimed at rousing the persons

he taught to self-examination, to testing their vague ideas and establishing truer definitions. In this he challenges the scepticism of his own and later ages and leads to the validity of clear, common, and tested opinion, from which Aristotle starts in the next generation and which is the basis of all science. And in the main thesis to which he always turns, he lays the foundation of social science as both Plato and Aristotle were on varying lines to develop it, that the individual lives only in and through the community, which is both the source and the test of his value. This, like many other weighty truths, had been implicit in society from the beginning, but it had never before been formulated and made a rule of conduct. When Plato says that ' each of us is not put into the world for himself alone ; at the call of the fatherland it is impossible not to follow ', we know that he is speaking his master's most cherished truth. Socrates was its first prophet and it led him to death.

No time could seem more unpropitious for the doctrine ; or was it the very extremity of the case which led to its first utterance ? The chance of a permanent reconciliation between the rival heads of the Greek states had been lost just after the brightest hopes of the Persian war. Athens had used her place as head of the maritime states for purposes of aggression and the exploitation of her allies. She had paid the penalty in their revolt and the general hostility of Hellas, and during the middle years of Socrates' life had been passing through the long-drawn agony of the Peloponnesian war. Before his death the downfall had come, the surrender of the city, the destruction of the walls ; and while most hard-pressed from

without, she had been most deeply torn within by contending factions and vindictive passion. It was just then, in the struggle of parties over the fate of their stricken city, that the man fell who had preached and practised the citizen's duty as the highest and most comprehensive rule of life.

We have now reached the last third of the Greek millennium which we distinguished at starting as the period of review in philosophy and decline in national power and spirit. This character is clearly true both of the work and the lifetime of Plato and Aristotle, the greatest Greek figures in the fourth century B.C., when the power of Macedon was steadily preparing to engulf the petty states of Greece exhausted by their internecine feuds, before handing them over two hundred years later to Rome, the final incorporator of the Western world. In exact science, the mechanical framework of modern thought and life, it is difficult to assign a definite share to either of the great philosophers, for the reason that their work was so comprehensive and so largely based on that of previous thinkers. In the case of Aristotle, that part of his work in which he showed most remarkably his own powers of observation and originality of view—his biology and politics and ethics—is precisely that on which his information was necessarily the most incomplete and liable to correction as life and society moved on. But on the social side, as summing up the constructive elements in Greek moral and political thought and putting out ideas of noble life, they have been ever since among the most potent forces in the world. Both had the curious good fortune to live through

the pagan Greco-Roman period and to be accepted in the Middle Ages as Christian philosophers in disguise. They have thus served in a special way, not open to any other Greek thinker, to keep unbroken the thread of philosophic thought in the Western world. But their very vitality and canonization entailed in the end a serious obstruction to progress. For when at the Renascence men unearthed the results of the Greeks in the exact sciences and went on where they had left off, in the case of the philosophers, whose work had been perpetuated, transformed, and hallowed, their wildest fancies became gospel and their obvious errors indisputable truth.

Plato, who was the friend and immediate follower of Socrates, developed in the *Dialogues* his master's teaching in the most glorious shape in which a disciple has ever been able to clothe his master's ideas. They are prose poems, full of fancy, enthusiasm, humour, and profound thought, written in the most graceful and persuasive language which was ever achieved even in Greek. Hence their assured immortality, as a glowing picture of Greek life and thought, as well as the strongest impulse in literature to a spiritual vision. Of special sciences, Plato was by his inward bent most interested in mathematics, and especially in geometry. He gathered round him a group of men engaged in mathematical research, and was probably in part the cause of the advance in these studies in the following hundred years.

Aristotle, who was forty years his junior, and first came to Athens as a member of his school, was a mind of another bent, positive and critical, keen on observation and on building up a complete structure of objective

knowledge, a biologist, while Plato was a mathematician. The contrast is sharp enough, but it has been overpressed in the schools and histories of philosophy: it is more to our purpose here to lay stress rather on the two main issues in which they agree, and which lie at the root of that co-operative human force subduing the world, of which we are tracing the rise in this sketch.

Looking back, each of these two great theses may be seen in germ in the teaching of Socrates; looking forward, each extends far beyond the scope not only of what Greek science had achieved in the fourth century B.C., but of what is even yet accomplished after twenty-three centuries of further life and thought.

The first main thesis is this, that there is a body of connected truth which men study, which leads up from the simplest and most general laws to the highest and most difficult to apprehend, that this knowledge is of the first importance both for the individual soul and for the society of which it is a part. Readers of the *Republic* will remember the wonderful passage in which Plato develops this thesis from the more disciplinary point of view, nearer to his master's. The sciences, as he elicits them in the conversation, are arithmetic, geometry, with special commendation for solid figures, astronomy, or solids in motion, harmony and dialectic. They are the studies which make the most demand on the deductive intellect, and they are presented in the best order for drawing the learner's soul from the elusive and conflicting details of sense to eternal and harmonious truth. Aristotle's scheme of knowledge is more comprehensive and objective: he offers in different parts of his

works matter relating to all the main branches of science, and though he finds the mainspring of education in a habit of mind rather than in knowledge, yet he too would consider the discovery and contemplation of truth as the highest employment for the individual, and knowledge as the guide of collective action.

The other main thesis on which the two philosophers are agreed is that man is by nature, as Aristotle puts it, a ' political being ', that he can only develop his powers in association with others, and that these associations must follow accepted principles of justice and order. Both philosophers devote their crowning treatises to moral questions, as conditioned by life in an ordered and civilized society. Plato in the *Republic* traces the analogy of the individual soul with a society, showing how each can only exist harmoniously and realize its highest nature if it is governed by a principle of justice. Aristotle, treating the same truth in a more practical and concrete way, presents ethics as part of politics, for without a social environment there can be no morality. He then studies in detail the types of character and government which best serve the end of happiness and good living.

In these treatises, and especially in those of Aristotle, we have the ripest wisdom of Hellas on social and political questions, so far as it was attainable under the specially Hellenic conditions of civilized life in a limited sphere, centred in the city-state. The limiting conditions were serious but obvious : the student can hardly miss them in making his application of the conclusions. There is the limited citizenship within the city walls, the hordes

of slaves, the undeveloped women, the mass of barbarians beyond the gates. No doubt it was the narrow and simplified problem which made a first approximate solution possible. But before the Romans came, or Christianity had breathed a world-wide spirit into the realm of morality and religion, the conditions of the older Hellas had themselves enlarged. Side by side with Alexander's conquest of the East came a wider social philosophy which had its roots also in the teaching of Socrates, but did not reach its full growth until the Romans had incorporated the whole civilized West. This was the Stoic system, which had its origin with Zeno, who took up one aspect of the Socratic teaching in Athens in the generation following Plato. We shall see its full development in the Roman world. Like the philosophy of Plato and Aristotle, it rested on an ethical basis, but it sought the sphere and sanction of morality in a universal law of nature with equal rights and equal duties for all mankind. This was the great stride in theory which succeeded the strictly Hellenic view. Meanwhile the teaching of Plato and Aristotle on moral and social questions, on education and on government, continued and will always continue of supreme interest, not only for its positive and permanent wisdom, but as representing the first reasoned answers to the largest questions in life, from the most gifted people in the world coming to them with an open mind.

In the path of exact science some long steps further were to be taken by the Greek genius before its light died away at last in the alien atmosphere of Alexandria.

The two main lines on which the Greeks went furthest,

mathematics and astronomy, are closely connected throughout: the former culminates with Archimedes in the third century B.C., the latter with Hipparchus in the second. Nothing more can be done here than give two or three of the greatest names and indicate the general scope of their achievement.

Up to the time of Plato Greek mathematics was mainly the work of the Pythagorean school. He studied this, and roused a wide interest in the further study. The fourth century contains many distinguished names in mathematics, of which Eudoxus is probably the greatest. At its end comes Euclid, rather the compiler than the discoverer. His *Elements* have the special interest of being the first connected treatise which survives; but for the origin of its various parts we are at the mercy of tradition, probabilities, chance quotations and references to earlier mathematicians in later writers. The quest is an exciting one, not unlike that of analysing Homer, and the results in detail cannot be much more certain. Eudoxus, who, after the Pythagoreans, probably contributed most, was in relation with Plato in early life and with Aristotle later on. He founded a school at Cyzicus, near the sea of Marmora, where Miletus, the birthplace of philosophy, had sent a colony four hundred years before. It will be noted how Greek science, after the concentration at Athens, again flourishes rather on the circumference of the Hellenic world.

After the fourth century and the summary of Euclid comes the greatest name in all Greek science, Archimedes, whose life fills the greater part of the third century and brings us in contact with the conquering Romans at his

native city of Syracuse. The stories of his life, the golden crown, the lever to lift ships, the terrifying engines of war, his death while drawing diagrams in the sand, are striking evidence that the struggle of mind with nature need yield to no other part of history in dramatic interest. He is the first pure man of science whose works have come down to us, including not only his treatises on geometry and mechanics, but also his letters. They show a man of noble simplicity, full of appreciation for the work of others.[1] He wishes his discoveries to be placed by the side of those of Eudoxus, who had led the way to his greatest triumphs, the quadrature of curves and the comparison of solid volumes by the method of Exhaustions. Eudoxus had proved that the cone was the third part of the circumscribing cylinder: Archimedes showed the sphere to be two-thirds. In the modern world, which can attack such problems by means of an infinitely more expeditious calculus, this part of his work will be studied mainly as a monument of mental force and ingenuity, and his name will be chiefly famous as the founder, on the statical side, of the sciences of mechanics and hydrostatics. Another name to be associated with his is Apollonius of Perga, ten years his junior, who on the side of pure geometry carried the work of the Greeks nearest to the conception of a generalized analytical treatment as established by Descartes. His extant work, from which

[1] 'Conon (who was then dead) would have discovered and made manifest all these things and would have enriched geometry by many other discoveries besides. For I know well that it was no common ability that he brought to bear on mathematics and that his industry was extraordinary.'—Heath's *Archimedes*, 151.

we know this, is on the conic sections to which he first assigned their general properties and probably their names.

Slightly earlier than the two greatest of the Greek geometers came the two pioneers in a scientific astronomy, Aristarchus of Samos and Eratosthenes, both members of the school of Alexandria. Both are famous for attempts on sound geometrical principles to solve two astronomical problems, and Aristarchus especially as the first man to maintain that the earth moves round the sun, an opinion for which, as Galileo in later years, he was accused of impiety. Aristarchus, by calculations based on the angular distances of sun, moon, and earth at the moment of half-moon, arrived at the comparative distance of the sun from the earth, vastly inferior to the truth but vastly greater than had hitherto been supposed. Eratosthenes, by comparing the height of the sun at zenith at the same moment at Syene and Alexandria, and dividing the result into the whole circumference of the sphere, gave the first scientific approximation to the size of the earth. In each case the idea of the method is the important thing. There were no instruments sufficiently accurate for the observations, and above all there was no trigonometry.

For this, and the consequent establishment of a scientific astronomy, the world has now learnt that it must look to Hipparchus, the greatest thinker in the second century B.C. His work is known to us mainly through the writings of Ptolemy, who in the second century A.D. summed up both ancient astronomy and geography in the book which the admiring Arabs afterwards named Al Magest. As the Greeks had finally decided for the geocentric theory, their system could, as astronomy, have only a provisional value: but it was nevertheless

scientific in so far as it rested on a mass of laborious and faithful observations, gave a true account of many phenomena, and made verified predictions about all the commonest celestial events. Roman writers after Hipparchus have spoken of the effects of Greek astronomy in allaying superstitious dread and implanting a sense of universal order in the popular mind. This sense had no doubt been growing ever since the Chaldean astronomers had watched the stars from the plains of Babylon and first taught the Greeks to observe them. It was of enormous value, but we should now perhaps give even more weight to the stimulus gained from astronomy for all kinds of scientific thinking, and especially for mathematics, the first field of science. It was the need of his astronomy that led Hipparchus to trigonometry, and trigonometry permitted the first mathematical tables to be drawn up and the first comprehensive view to be obtained of the mechanics of the universe.

Hipparchus was still observing in the island of Rhodes when Achaia had become a Roman province. The old motto and boundary for the expansion of Greece was from 'Achilles to Alexander'; it suggests movement and conquest and the vigour of youth. From another point of view, more cognate to our present purpose, from 'Thales to Hipparchus' would better describe the mental progress to the Greeks. In taking this measure, we are not limiting our view to the mechanics of intellect or asserting that a mathematical lemma is in itself more valuable than a play of Euripides. But, as with the savage, we found that no better measure of their advance was available than a comparison of their tools, so with the Greeks their progress in science is the most charac-

teristic thing, bound up with the rest of their achievements, but more clearly progressive and more persistent. For their science was still growing, when literature and art were reminiscent, philosophy stagnant, and freedom dead.

The scientific spirit, therefore, of the Greeks shall stand first in their account. But with it and through it we must try to read the other aspects of Greek life and thought. Its kinship with the growth of personal and political freedom is suggested by the story of events. Its relation with their idealizing art is, on the grounds of the common intellectual tendency, still more certain; each aims at rising above the particulars of sense and attaining a general and perfect form. In the sphere of social life and government, though the means were wanting to great achievements, the same spirit of analysis and ideal reconstruction has given to later ages, through the great philosophers, the best possible sketches within their limits of the fundamental conditions of success.

And there are throughout the Greek story traits of character, not strictly intellectual, which yet have many links with the same movement of the mind. They failed to build lasting political unions, they fought violently and sometimes treacherously among themselves, yet in their literature, as in their life, there may be traced a growing sense of human fellowship, a respect for others, a delicacy of feeling and a care for immaterial things to which neither the theocracies before nor the Romans after could lay claim. These were considerable elements to be infused into the coming world. They are not the least of our debts to Greece.

5

THE ROMANS

Tu regere imperio populos, Romane, memento
(Hae tibi erunt artes), pacisque imponere morem,
Parcere subiectis et debellare superbos.

VIRGIL.

The Romans, who were to absorb and enforce the work of Greece, and to form the strongest union yet seen among the leading peoples of the world, were another branch of the same Indo-Germanic or Aryan group. They were indeed closely related to the Greeks in blood, in language, and in early history. If Celts and Teutons and Slavs are cousins to the Greeks, the Romans are brothers. The number of terms common to the two languages, beyond those going back to the common Aryan stock, suggests that the two races had dwelt some time together after the other branches had broken off. Thus they have common words dealing with houses, agriculture, boats, vines, clothing, the family, the gods, and primitive government. The Romans, or Latins, came, like the Greeks of the migration, from lands north of their historic home, but unlike the Greeks, whose entry on the scene was celebrated in splendid sagas going back to the time of their migration, the Romans, when we first find them, in the dim dawn of their history, are already settled in the central Italian plain, and already by force and policy binding the neighbouring communities to themselves as allies.

Their geographical position in Italy was as important a factor in their evolution as the conformation of the Aegean was to the Greeks. Rome is in the middle of the west coast of Italy, in a fairly fertile plain and on the banks of a navigable river, some fifteen miles away from the sea. Every point carried weight. Their soil, not too fertile to deprive them of motives for expansion, was

fertile enough to repay cultivation and to leave something over for foreign trade. For commerce the settlement was specially well placed. It was defensible, in a central position, and not on the sea though easily accessible from it. Being in the middle of the peninsula, they had the best possible chance of stretching across it, of barring north from south and ultimately of gaining command of the whole. Above all, while early in touch with the neighbouring Greeks, their own trend was as markedly to the west as the Greeks' was eastward. It was, as we shall see, their western expansion, giving them, at the first great crisis in their history, Spain, and at the second, Gaul, which built up the empire and enabled them to bring together the whole Mediterranean world.

But powerful as these geographical influences must have been, it would be an even greater mistake to rely mainly upon them in the case of the Romans than in that of the Greeks; for, looking back as far as the eye can penetrate the mists of early Rome, we see there in language, national character, laws and religion, the germs of those principles of action and policy to which at every point in their triumphant progress their success was demonstrably due. It was clearly a case of perfect suitability between the developing organism and its environment.

The great words which we owe to the Latin language, especially those which go back furthest in their history, shed streams of light upon the causes of their national success. 'Fas' and 'Jus', that which is right or binding, the former from the religious, the latter from a more social point of view, are two of the oldest and most

venerable. From 'Jus' come 'justice', 'jurisdiction', 'jurisprudence', abstract and general terms of course, but elaborated and embodied by the Romans in a system so efficient that it has largely survived its authors, and remains as an endowment to the modern world. 'Patres', 'Patria Potestas', 'Familia' are as characteristic of the Roman as 'home' of the English; and though the word, like other scientific terms, is Greek, Rome is the classical example of the 'Patriarchal Theory' as the typical form and root of all complete political organization. 'Social', 'society', and the newly coined 'socialism' and 'sociology' all recall the Latin 'socii', and with it the successive steps and method of their expansion. And 'religion', the greatest word of all, is as characteristically Roman as 'philosophy' and 'mathematics' are Greek. Whether we trace its origin to the root which signifies 'going over again' and observing one's duties to the gods, or to the root which means 'binding' the individual to something outside himself, in either case 'religion' reminds us rather of the Roman who veiled and bowed his head in worship, than of the Greek who looked up to heaven when he sacrificed.

The force of their legal genius and social organization appears at every turn in Roman history; the special qualities of their primitive religion, as compared with that of the Greeks, are less obvious in the story, but highly significant of the issue. Whereas the early Greek was always weaving legends about his gods, connecting them with his own national origins, and in the heyday of his art figuring them in pictures and in marble as the most beautiful imaginable forms of human beings, the

Roman wove no legends and carved no images. His gods were of the useful and practical order, presiding over every act of his daily life, every operation of the fields. There was a goddess of child-birth, a god of sowing and of harvest, a divinity protecting every cross-road and honoured at every hearth and every doorway.

A god presided over the march of the army, and in another form gave it the victory and sanctified the faith of the treaty that ended the war.

It was the religion of men who in the days of their strength went as a duty from following the plough to leading an army, and, whatever the enterprise, never faltered or turned back.

The period covered by their national development may, like that of the Greeks, be put roughly at a thousand years; but the Roman millennium begins later and extends well into the Christian era. If we reckon the Greek period from the time when they had occupied the Aegean archipelago and had begun to send out colonies, the Roman must be dated from their consolidation of the Latin communities at the beginning of the fifth century B. C. It comes to its climax at the beginning of the Christian era, when the light of Greece as a nation has gone out, and it lasts into the fifth century A.D. when the Western Empire is broken up and a barbarian king rules in Rome. The Eastern Empire continues for another millennium the ideas of both Greeks and Romans, but with substantial changes. We shall only notice here a few of the most salient points in this Roman evolution, those which best illustrate the way in which they built up their marvellous structure of law and government, and established the

ideas of social order which are their bequest to mankind, as science and philosophy are the gift of Greece.

Both aspects of human activity are closely intertwined ; both are essential to the task of human co-operation in subduing the world ; but whereas the Greeks contributed most to arming man's mind for the struggle, the Romans did most to enable men to work in an orderly sequence and harmoniously one with another.

The material for the study of Roman origins is meagre, compared with the wealth of legendary story in Greece. The little community on the Tiber was at first governed by kings of the heroic stamp, like those of Greece. North of the Latins, in what is still called Tuscany, lived the mysterious people, whose remains, so strikingly resembling those of Mycenaean Greece, we are only now beginning seriously to study, and whose language is still unread. The later kings of Rome were of this race, Etruscans, and to them the early city seems to have owed its military organization and much of its defensive strength. The Tarquins or Tarchons (Etruscan for a ruler) held sway in Rome at the same epoch when the ' tyrants ' of Greece were ruling their communities round the Aegean and in southern Italy. Towards the close of the sixth century B.C. the Tarquins were expelled from Rome by a movement parallel to that which destroyed the tyrannies in the Hellenic world. At this point the characteristic Roman movement begins. It had a twofold aspect, consolidation and equality of rights within the state, extension of territory and organization without.

After the monarchy, the magistracies which took its place were at first assumed without dispute by leading

men of the 'patrician' order, i.e. the original clans who founded the city. But there were besides these, and soon to be set in sharpest opposition to them, a mass of the non-patrician, or 'plebeian' classes, who are variously supposed to have arisen, either from a distinct subject race or, more probably, from the dependants who gathered round the patrician houses. The internal movement of the early centuries consisted in the adjusting of the relations of the conflicting orders, and gradually admitting the unprivileged to equality of rights with the older tribes. In this the Romans showed the same conspicuous skill in practical affairs which guided them at all later crises till decay set in. They faced each grievance as it arose, and adjusted their laws and constitution to meet the new necessity without discarding the old order. Side by side with this went the external movement, by which the power of the republic was gradually extended till it first formed the central and strongest state in the peninsula, then incorporated the whole, and finally embraced such large and varied territories that, in the last century B.C., the old republican government at the centre broke down, and, by another Roman adaptation, gave place to the empire. The two movements, within and without, were, as we shall see, linked closely and causally throughout.

Two consuls elected for a year by the patrician assembly assumed all the powers exercised by the kings, and like them became the first of the Patres, the fathers of the state. The 'fathers' power' or 'patria potestas' gave them the priestly function of taking the auspices. They led the armies and presided over the assembled fathers

in the senate, which they consulted as their 'family council'. They were the chief judges, and, like a father in his family, had power of life and death. In an emergency full powers—the 'imperium'—might be conferred on one man, the dictator, most often needed to lead the army in a crisis.

As the work of the state became more complex and grew in bulk, this first simple form of republican government proved inadequate. The consuls were but a duplication of the king to checkmate a despot. Gradually the consuls' functions were distributed among other magistrates, of whom the praetor, or chief legal magistrate, came next in rank. His title was, in fact, originally an alternative for the consul's; in later history he became the mouthpiece for Roman genius in building law. Proconsuls and prefects were added later to represent the consul and praetor in colonies and other communities beyond the walls.

The internal movement, the fight of the plebeians, was for defence against arbitrary power, for election to the magistracies themselves, for recognition of their own assemblies as well as those of the older clans or 'gentes', and for the gradual equalization of all civic and political rights. The struggle was long and persistent, but it was composed at every stage by some characteristic Roman stroke, and ended before the crisis of the last century B.C. in the complete assimilation of the plebeian classes. The questions which were then at issue were on a wider plane, but still had points of contact with the old class struggle, and their treatment called for a still larger exercise of the same gifts which gave the republic its unique and immortal triumph in the earlier centuries.

In the first step of this internal movement we see its

intimate connexion with the growth of Roman power without. The loyalty of the plebeians in the army was in the first year of the republic secured by the grant of an appeal to all the citizens, in their 'centuries', against any capital sentence, except that passed by a dictator. And early in the fifth century, the first century of republican history, the next great step was taken, which proved still more decisive in the sequel, the concession to the plebeians of a magistracy of their own, the 'tribunes', whose prerogative it was to protect any plebeian against a patrician officer under a special oath of sanctity for their persons. This institution, which soon developed its unexampled powers, was due to the demands of plebeian legionaries, just returned from a successful campaign. Shortly after followed the first step in the incorporation of Italy, the alliance with the other Latin communities of the Campagna, which enabled Rome to face with greater security both the Etruscans to the north, whose yoke she had just thrown off, and the rude hill tribes who surrounded the Latin plain to the south and east, and were the next obstacle in the way of her advance. Within a few years from this the plebs had succeeded in getting promulgated the first code of Roman law, the famous Twelve Tables, the fountain from which the stream of written law flowed on in widening courses through all the ten centuries of Roman history, until the great jurists of the empire reviewed and collected it for the use of all civilized men. The Romans then, as the Greeks democracies just before, were unwilling any longer to accept the oral traditional judgements of patrician magistrates on matters of life

and death, person and property. The story ran that a special mission was sent to Athens, before the Tables were drawn up, to study the laws of Solon, which had been in force there for over half a century. However this may be, we know that Rome was deeply indebted to Greece both early and late in her career. The difference in the result was due mainly to the greater practical skill with which Rome developed her system, assimilating as she went all that came to her from without.

The fourth century continues the parallel progress in Rome's development. Within the state, citizens of all classes were being gradually admitted to all the magistracies. Without, Rome was steadily extending her sway over the middle and southern parts of the peninsula, a process broken only in this century by the startling invasion and burning of the city by the Gauls, or Celts, from the north.

The beginning of the third century sees perhaps the most striking of all the coincidences between the outer and the inner movements. In 287 B. C. a law was carried giving measures passed by the plebeian assembly the force of law, without the sanction of the Senate; and twelve years later we have the last decisive victory, which gave the supremacy of all Italy, south of the Arno, to Rome. Pyrrhus, the Macedonian adventurer, who attempted to set up a Greek empire in the west without reckoning with the Romans, was expelled, and the Greek states in the south were finally brought into the Roman system, with which they had been for the most part on friendly terms.

Thus at the beginning of the third century the founda-

tions of the empire had been firmly laid by consolidation within and without. As all citizens had been required for the work of conquest, so all had been admitted to full and equal rights: this is the short but adequate formula for the whole process from within. Externally, the subjugated and allied peoples were bound to Rome by a system which forbade all external relations except through the suzerain power, preserved as far as possible local institutions, and rewarded the faithful by grants of closer relationship, franchise, intermarriage, and commercial privileges.

In the next period this consolidated and victorious power proceeds, from the basis of an allied and firmly united Italy, to incorporate the whole Mediterranean world.

We can only notice the two critical points. The first is the struggle with Carthage in the second century: the second Caesar's conquest of Gaul and subversion of the republic just before the Christian era.

In the first, Rome took up and completed the traditional struggle of centuries before between the Greeks and the Phoenicians. At the same moment that the eastern Greeks were vanquishing the Persians at Salamis, the Phoenicians from Carthage had been defeated by the Greeks of Sicily. But the Greek victory was inconclusive: Carthage had flourished still more in the two centuries since, and now faced the Romans as an unavoidable barrier to that western expansion on which their empire depended. Rome or Carthage must rule Spain, and from Spain Gaul and the whole West. Rome had the advantage of her position, her national character, and her kinship

with the western people. Carthage had her wealth, her trade, her ancient traditions, and the greatest military genius of antiquity, bound by ancestral enmity to pursue the war with Rome. In the second Punic war, when Hannibal ranged undefeated over the whole of Italy and marched up to the walls of the city, the Roman spirit was seen at its best, strengthened by the republican discipline of three hundred years. Senate and people were united, and at the lowest moment of their fortunes never dreamt of peace without victory. It was found impossible to form any rival combination in Italy against the Romans. Hannibal was never beaten, but Rome won.

At the second point—Caesar's career—the scene has changed. Rome is triumphant. Carthage has disappeared, and Sicily, Sardinia, Spain, and northern Africa have come under Roman rule. The East has been invaded, and Macedonia, Greece, Asia Minor, Syria brought into the Roman sphere. Gaul and northern Europe still remain untouched, and meanwhile such new social evils and difficulties in government have arisen as only the strong hand of one master can redress.

The old republican government was unable to cope with the growing burden thrown upon it. New provinces, large permanent armies under successful generals, masses of new wealth, new ideas and alien people were flowing in. Neither the system nor the spirit of the rising capital of the world was equal to its task. Imagine —a rough analogy, of course—a House of Lords, not hereditary, but composed for the most part of returned proconsuls, enriched with the spoils of war and the extortionate government of provinces, claiming control

of army, finance, and all foreign affairs. This was the Senate, and it was faced by a popular House, which had in theory the right of passing laws and appointing magistrates, but which, through the pressure of the new wealth and new nobility, had gradually in practice relinquished all real power.

Such were the conditions, which only awaited a successful general, with sufficient political insight and sufficient force, to overcome all his rivals and seize and reorganize the state. Several returning generals had attempted it, as the nominee of one party or the other. Caesar was the first who combined all the needed qualities and possessed them in such a degree, that, though the jealousy of outraged nobles allowed him but a few months' power, he was able to lay down the lines on which the reconstruction was to proceed, and became in title, as in reality, the founder of the Empire. A patrician by birth, he was by family tradition on the popular side: by genius he was able to rise above mere party differences, and see the real needs of the state and the only means of satisfying them under the conditions of the time. His senior and rival, Pompey, had won his power by a command in the East, where he had cleared the seas of pirates and settled the Roman provinces in Asia Minor. It was left for Caesar to come back to Rome as the conqueror of Gaul, the keystone of the West. The 'imperium' of the commander in the field became at last in his hands, as Dictator, the supreme power in the city itself, and the short five years between his return and his death, interrupted by the war with Pompey, were used with unflagging energy to carry out the most urgent reforms.

and lay the foundation of the imperial system of the later half of Roman history. We shall notice only those which illustrate our central theme.

The outlying parts of the Roman state, which were ultimately to profit most by the Roman system, were at this time the most impoverished by it. Governors, tax-gatherers, and usurers had been for years battening upon the provinces almost without restraint. Caesar checked this by a system of 'legates', dependent upon himself, and thus kept in his own hands the command of the armies and the government of provinces. Italy, too, had suffered by depopulation and the absorption of the old small farms in large slave-worked estates owned by the new capitalists. Caesar settled his own veterans and others on the land, with as little disturbance as possible to existing rights, and required owners to find employment for a certain number of free labourers. New settlements, too, were made at Carthage and Corinth and many decayed towns in Italy. His government of Rome itself was equally wise and vigorous, but the problem of how to fit the new imperial power into the old republican forms he did not live to solve. It was left for the lesser genius and greater tact of Augustus. Julius himself was content, during his tenure of power, to govern as Dictator. This office, frequently used before in republican history, was now, in the last year of his life, made for the first time 'perpetual'

The murder of Caesar only delayed the settlement some dozen years, and imposed a long and desolating war upon the Empire. At Actium in 31 B.C. his party and ideas finally prevailed, and Augustus was then able, at leisure and in the safety of general exhaustion, to elaborate a

system of absolute rule under republican forms, which is the greatest triumph of Roman statecraft and the strongest evidence of his own skill in management. All the republican magistracies were retained and treated with formal respect. The Senate was consulted and considered in theory to be the source of all power and the arbiter in all legislation. But the new Princeps sat among them, 'primus inter pares' by courtesy, but being armed with both the 'imperium' of the commander and the 'potestas' of the old tribune, able in fact to do with the Senate and with the whole government as he pleased.

At this moment we enter on the period of Rome's greatest power, when having absorbed, so far as she was able, the Greek results in philosophy and art, she proceeded to administer during the last half of her millennium all the countries of the Mediterranean and the near East. It was a profoundly important but a less critical era than several which had passed. At the crisis of Greek national life and thought against Persia, the onlooker might well have been in doubt as to the issue; and when the rising power of Rome was pitted against the greatest naval force of the Mediterranean, a different result might have been predicted. Again, at the crisis of the republic, it would have been a bold forecast that in less than fifty years the whole Roman world would be consolidated, enlarged and peaceably governed by one undisputed master. But, after the work of Julius and his nephew, there was so great a change, both on the face and in the spirit of the Western world, that uncertainty gave place to unquestioning confidence and rest.

As in Athens after the Persian struggle, so now the

greatest poets of Rome were inspired to celebrate the triumph, but in a different tone. For whereas the Greeks hailed a new wonder, the victory of allied bands of freemen over an old-world foe, Virgil and Horace sang the return of the golden age which had preceded all the troubles and conflicts with which man's actual experience was filled. Another race of gods had descended in the emperors, who had restored the fabled peace and plenty of prehistoric days and founded another age of virtue and prosperity which would continue and increase for evermore. Not freedom and conflict, but repose and happiness were now the notes. Much courtly compliment, no doubt, much natural relief and exultation at the settlement; but yet the wise observer might well have thought that now at last a permanent centre of government and civilization had been established from which in time all the surrounding barbarism might be transformed. And by devious paths and through many apparent disasters, this has in substance taken place. The Roman Empire was in essence the embryo of the modern world, and Europe and the West to-day are Rome enlarged.

The main elements from which this new world was to arise had been growing together for many years. From the earliest times, as we have seen, the Romans had been indebted to Greece; the City-State itself, of which Rome was the triumphant example, was in many essentials a Greek institution. In the second century B.C., when Rome had finally defeated the common eastern foe, and Roman armies had made their way into Hellas, the study of Hellenic language, art and philosophy

became the fashionable type of education. In the age of Cicero, a hundred years later again, the Greco-Roman spirit, of which the empire was the administrative embodiment, was fully and consciously developed. Cicero himself is the best type of it, for with the studied impartiality of the compromising mind, he combined a sincere attachment to old Roman virtues and institutions with a keen and open-minded interest in Greek philosophy and new ideas. Few passages in ancient literature are more significant, or come home to us with a more modern touch, than the familiar story which Cicero tells of himself as commissioner in Sicily, how he searched out the tomb of Archimedes and found it at last all overgrown with brambles, and how he cleared the cylinder and sphere, the symbols of Archimedes' crowning theorem, and restored to Syracuse the memory of her greatest citizen, which, says he, but for a man from Arpinum—the country town in Italy where he was born—they might have lost for ever.

The Western world was thus preparing for the great amalgamation of the Empire, and the last century B.C. is full of such convergences. At its commencement we have the preaching of Stoicism in Rome, that phase of Greek philosophy which was the most congenial to the Roman temper, and was to inspire the noblest rulers of the Empire in its prime. In this movement also Cicero played a leading part, presenting in his moral treatises the Stoical ideas of the time, especially those of Panaetius, a leader of the school, who had divided his time between teaching in Athens and in Rome. The full results of the system appear two hundred years later,

above all in the maturity of Roman law. We note it here in this age of convergences, as a symptom and a cause, not only of the union of Greece and Rome in the Empire, but of the spread of a deeper and more real sense of common humanity than the world had ever known before.

And at the end of the same century comes that fire from the East which was to burn up the remnants of the old mythologies, and, partly combining with, partly displacing, the old philosophies, to create in the later centuries of the Empire a new spiritual force of quite another order.

Geographically the Empire was, in spite of its size, a political unit of remarkable symmetry and coherence. It was practically all the land easily accessible from the Mediterranean Sea, with its centre at Rome rather inclining, as we have noted, to the West. Like higher organisms in the animal kingdom, it had its two sides roughly duplicating one another, in the eastern and the western portions, which, when the vigour of the whole body had decayed, fell asunder and formed the western and the eastern empires of the Middle Ages. But for the five hundred years of its official unity it remained, with comparatively small changes of frontier, intact, and demonstrated by its very existence the force of its internal unity and the needs which the imperial system was able to satisfy. One may consider—and in the light of subsequent events it is easy to be wise—that there was one serious omission in the 'rectification' of the frontier, and one or two mistaken attempts to expand in a wrong direction. It certainly seems a mistake, and

was a grave misfortune, both to the Empire and to Europe later on, that the repulse of Augustus in the German forests prevented the frontier being carried forward in that direction to include the Franks and the Saxons in the Roman sphere, and make the Elbe the boundary and not the Rhine. The failure to do this postponed the conversion of Germany till the time of St. Boniface and Charlemagne, in the eighth and ninth centuries. It was a mistake of the opposite kind to force the Roman standards, as Trajan did, on to the Persian Gulf, and to attempt the incorporation of Parthia.

But the Roman world was in the main the Mediterranean world, and it grew rapidly together, when at last a conquering people arose in a central position, and with a gift for organization. Once united under Julius and Augustus, it remained in extent much as they had left it, until the last emperor was deposed in Rome. From many points of view the real unity persisted after its external forms were worn out and thrown away. Nor is it even now extinct, though an alien power, strange in all respects to Greco-Roman ideas, has been for nearly five hundred years occupying the last seat of empire on the Bosphorus.

The five hundred years of the Empire fall naturally into three periods. The first two hundred years, till the death of Marcus Aurelius, were its era of greatest prosperity and best government, of growing consolidation and improvement of the system, especially on the legal side. The intervals of misrule, the cruelties of Caligula and Nero and the civil war ended by Vespasian, were short and limited in their ill effect to a small area, and the five emperors who succeeded Domitian were the

ablest, most devoted, and most successful rulers into whose hands the welfare of the leading portion of mankind has ever fallen. The age of the Antonines is rightly proverbial as an illustration of how well the system could work under the guidance of good men.

The hundred years which followed, between Marcus Aurelius and Diocletian, showed the two capital weaknesses of the central government, the power of the army and the difficulties and dangers which attended the succession of the emperors. The ablest of them would yield to the temptation of appointing their own sons to succeed them, however ill-fitted for the post, and steadily throughout the period the real power fell more and more into the hands of the armies, who put up and deposed emperors at their will.

At the beginning of the last period, the two hundred years from Diocletian to the extinction of the western empire, a new form of organization was tried, to avoid the evils of civil war and obtain a succession of experienced rulers. The Empire was divided for administration into two parts, East and West, with an Emperor—Augustus—at the head of each and a Caesar under him in training for supreme power. In the hands of Diocletian himself, its founder, the system worked fairly well, but it marked definitely the point at which Rome ceased to be the centre of the civilized world. Diocletian fixed his own residence in the East and that of his colleague at Milan, and when, forty years later, Constantine for a time reunited the whole, he placed the new centre at his own city of Constantinople, built on the site of the ancient Byzantium at the spot where Europe looks into Asia across the famous straits. The seat of Empire at the old

centre was thus left vacant for the new spiritual power, which Constantine at last recognized, and which was to reincorporate the western provinces as they slipped gradually from their political allegiance.

Two weighty facts appear in this last period of the old western Empire which shed the greatest light on its ultimate disintegration. The surrounding barbarian tribes were admitted in larger and larger numbers to settle within the borders, to replenish its failing population, recruit the army, and even hold positions of trust. And to preserve order, administer justice, and extract the ever-increasing burden of taxation, a civil service was established, distinct from the army, but like it dependent on the emperor himself. This burdensome bureaucracy of Diocletian and the long and insufficiently guarded frontiers were potent factors in the decline.

Such is a bald outline of the external facts; beneath these was proceeding throughout the unifying process which, consciously or unconsciously, was the real task which this government had to perform for the varied elements which had come together under its control in the central nucleus of Western civilization.

It remains to indicate the main agencies by which this unity was promoted in the Empire, and the main results, both in organization and in thought, which have followed and endure. The study of these is in effect the basis of all modern history and is in no case yet completed. Of our own country, for instance, no one has yet given us a full and living picture as it was in the Roman Age,[1] when for

[1] Haverfield's *Romanization of Britain* (Clarendon Press) is the nearest we have. It gives the extent and successive stages of the process.

the first time it came within the circle of civilized history. But everywhere it seems true to say that the further the inquiry is pressed, the more intimate and binding the Roman influence is seen to be. It is more than a superficial analogy when we speak of such a system as an organism, as a body politic. It had its skeleton, or substantial framework, in the system of fortresses, linked by paved roads and manned by legionaries, which held together the diverse lands and multitudes of people from Mesopotamia to Finisterre, and Hadrian's Wall to Upper Egypt. Of these there are abundant remains everywhere, substantial and lasting symbol of Roman power, and they contrast significantly with the water-ways of the Greeks.

The centre of the system, controlling and moving the whole, as the brain the nerves, was the emperor himself, who united all the threads both of civil and military administration. At the happiest moment, in the second century, when the whole body was vigorous and the mind of a Trajan or an Antoninus was in control, the general prosperity of the populations affected would probably have compared not unfavourably with that of any other epoch before or since. Imperial rescripts, the thanks of the governed communities, the public works carried out, sometimes the private instructions of the emperors, all attest both the humanity and the success of their government. Of the last class of documents the correspondence of Trajan with the younger Pliny, when governor of Bithynia, is the most instructive as well as pleasing. In these letters the emperor shows himself to have been, as a man, kindly and laborious, conscientious in detail, full of the responsibility of his position, as

a Roman, careful of law and precedent, zealous above all for order and conciliation, and as an educated European of the second century A.D., conscious of the rights of common humanity, proud of the age in which he lived. The reign of Antoninus Pius illustrated the same principles with added stress on the need of peace and economy, and in Marcus Aurelius the very spirit of Stoicism, austere offspring of the Greco-Roman union, was at the helm.

But while under such guidance the organized world prospered and grew both more humane and more united, the guidance itself was precarious and changeable, and, even at its best, could not have arrested the disease inevitable in a system where the principles of individual and religious freedom were not yet understood. The great emperors were a minority, and the greatest could not have stayed the depopulation of the Empire and the growing inroads of the barbarians. Something, however, which was independent of individuals and could survive them, was being constantly produced by the working of the system, and by the union in the government of the world of the practical genius of the Roman with a strain of Greek analysis and generalization. This was Roman law, perfected under the best of the emperors in the second century, and constituting, enactments and principles together, the most precious definite legacy of Rome to mankind.

The analogy of Greek science and philosophy is a sound one. If we were justified in treating abstract thought, shown both in science and in art, and best measured by the intellectual evolution from Thales to Hipparchus, as

the special characteristic of Greece, in the case of Rome, the system and science of their laws is the most enduring product, and the measure of their evolution—from the Twelve Tables to Gaius or Justinian. But as we might expect of the greatest work of the eminently practical people in history, we cannot detach it from their general activity and treat it as a thing perfect and sufficient in itself, as we can a Greek statue or Greek geometry. Roman law is the special expression of Rome's practical genius in widening precedents to meet new cases, in building up new structures on old foundations, and using every bit of the old material that would serve. So it kept pace with the growth of their Empire and the widening and humanizing of their ideas. In the earliest stages, as we saw, its history was similar to that of the early Greek states and of other youthful people. The bulk of the citizens, after coming to live together in a city-state, claimed the protection of a written code against the violence and unequal rule of the old noble and wealthier families. This movement created the Twelve Tables in Rome, as it had led to Solon's legislation in Athens. Then followed the specially Roman evolution. The Praetor, the magistrate in charge of the administration of the laws, was called upon every year, on entering his term of office, to issue an edict stating the principles on which he intended to act, and any modifications in the practice of the courts which he proposed to introduce. In this way he was able to deal with the constantly growing mass of new cases and difficulties caused by the intercourse of Romans with strangers of diverse customs. 'Ius Gentium' thus meant originally the law of these non-Roman peoples, the

common law, as some have said, of the Mediterranean world, as distinguished from the Ius Civile, the birthright of the Roman citizen; and it was naturally at first regarded as an inferior though necessary exception. But the progress of reflection and the widening of the area of comparison caused the jurists gradually to assign a higher validity to those common notions which were discovered at the basis of the laws of different nations. This tended to what we have since called 'equity', and it was accompanied by a simplified process in the Roman courts themselves, where more and more importance came to be attached to the real purpose and essential justice of an action, and less to the observance of the old prescribed formulae.

At this point the influence of Stoicism began to work. 'Living according to nature' was the crowning precept of this philosophy, and it had an obvious application to law as well as morality. In theory there was a tendency to idealize this Law of Nature or Ius Naturale, and to identify it with the old Ius Gentium, or at least to regard it as its basis. In practice the jurists of the Empire began to do rapidly and on principle what the praetors had been doing gradually from year to year through force of circumstances. They were introducing a new philosophic ideal of simplicity, symmetry, and general truth. It was under the Antonines, when Stoicism was on the throne, that this extension and reform of the legal system made most progress and Roman law became the summary of Roman experience enlightened by Greek philosophy, and the model for later codes.

Returning, then, to the main purpose of our sketch, we see that among the agencies that have done most to

build up the collective force of man for the conquest of nature and the improvement of his lot, one of the highest places must be assigned to Roman law. It was the leading agent by which the Romans carried out their incorporation of the West and also their most notable bequest to the nations who have since taken up the task of the vanguard of mankind. In a thousand ways, sometimes outside the strictly legal sphere, it has worked in later years to preserve those principles of order and continuity in development, which the Roman genius first established in the world. In the law and organization of the Catholic Church, in methods of local and colonial administration, even in the essentially diverse feudal system, large traces may be found of Roman law and Roman procedure. In matters of pure theory, the realms of moral philosophy and theology, the same influence has been at work. The very notion of an ordered progress in human affairs, of which this book is an illustration, takes its rise in the study of Roman law. It was in the school of law at Naples, early in the eighteenth century, that Vico first conceived and sketched the idea of the ' historic ' method in studying the past, which has grown in force ever since, and now dominates our view of history as completely as Darwin's theory has revolutionized biology. For Vico, inspired by the history of Roman law, was the first to suggest that changes in civilization could be interpreted according to an ordered sequence, which has its moving force in the growth and change of the collective mind of mankind from generation to generation. The Romans had offered in their history the most unmistakable instance of such a sequence. Their genius was as apt

for building up institutions and human law as the Greek for discovering the abstract laws of thought and nature. And the fact of progress was in the first place more easily apprehended from the rules and conditions which man had made to surround his own life, than from the less visible, though more fundamental, changes in the general ideas which form our science, philosophy, and religion. Thus it is that 'progress' is a Latin word, and that the Romans first suggested the idea, while we have not even yet fully realized what the Greeks did for the growth of the human mind, nor the place which abstract thought must take in a true view of historic evolution.

The next stage in Western history illustrates this conclusion in a striking and unexpected way. At first sight, in mediaeval Europe Roman institutions seem to have been completely shattered and the onward course of science hopelessly obstructed. But in the end it will be seen that, by a fresh direction of the intellect, the Roman work of incorporation was being actually extended, and in power and depth the collective mind strengthened, though on other lines than the Greeks and Romans could themselves have understood.

6

THE MIDDLE AGES

The Papal hierarchy constituted in the Middle Ages the main bond between the various nations of Europe after the decline of the Roman sway, and the Catholic influence should therefore be judged not only by the visible good which it produced, but still more by the imminent evils which it silently prevented.

—Auguste Comte.

It was noticed in the last two chapters that two periods of a thousand years, overlapping but not exactly coincident, would cover roughly the rise and flowering of the Greek and Roman genius. Another millennium, following on the break up of the Roman Empire, embraces what are still commonly called the 'Middle Ages'. There is another coincidence with a significant difference. Three great poetic works have always and rightly been accepted as signalizing the three great movements; but they stand at different points in the course of each. Homer, marking the emergence of the Greeks from the barbarism of the migrations and the sagas, comes near the beginning of their evolution. Virgil, who celebrates the climax of a work of conquest and incorporation, comes midway in the Roman period. Dante, who expresses even more perfectly the essence of mediaeval Catholicism, is almost its last great voice. It will be seen, as we proceed, why such a perfect expression of an age so difficult to grasp could only come when it had nearly run its course. Built up on the ruins of an ancient system and full of new life seeking fresh forms and outlets for its vigour, the mediaeval system impresses us at first more perhaps by its wealth of contradictions than by any one of those special features which have led men to call it, sometimes the 'age of faith', sometimes the 'dark ages', sometimes the 'age of chivalry', sometimes the 'age of law'. It exhibits elements which justify them all, kings celebrated for their services to learning who had never learnt to write, orgies

of savage cruelty in the interests of the purest of religions, loose lives and ecstatic aspirations, rough hands and meticulous theory. Light on this apparent tangle of interests and motives will only come if we approach it from the side of religion, the new spiritual life and organization which was the inspiration of the East into the old framework of the Greco-Roman world falling to decay. No better image of the whole has ever been given than by a recent writer,[1] who compares the spiritual state of mediaeval Europe to an alpine range, on the lower slopes of which the explorer finds himself entangled in an undergrowth of pathless thicket, but as he ascends discovers wide snowfields and soaring peaks, from which he may survey the panorama of a new world in radiant light and with majestic outlines stretching as far as the eye can reach. How far and in what ways did this new order work to strengthen the collective force of mankind in its task of subduing the powers of nature and turning them ultimately to the common good ?

Clearly in one way the loss was immense, if we compare mediaeval Europe with the world under Trajan, when cultivated men like Pliny were carrying out the wishes of an enlightened master, conceived in the interests of the whole population he commanded. But the imperial system was in decline long before the Catholic hierarchy had entered into its full powers. The ideal of the empire, to embrace in one political orbit all communities of civilized men, would have become an increasingly impossible one, as the limits of discovery and human intercourse were extended : its realization was a miracle

[1] H. W. C. Davis, *Mediaeval Europe*. Home University Library.

of organization in the days of the Antonines. With the barbarization of the frontiers and the depletion of the old governing class it broke down, and even before the next extension of the area of civilization, new divisions had been formed. In the fourth and fifth centuries, before the extinction of the western Empire, we see the nuclei grouping themselves round the barbarian tribes who had made good their footing. From these new groupings within the old Roman framework the modern nations of Europe arose towards the close of the mediaeval period. In each of the old provinces of the Empire there was an admixture of new barbarian blood with the old population, and the varying blend has left in each case large traces in the language, government, and general civilization of the rising nation. In this infusion of new and vigorous life into the old associations and organization we find the germ of modern nationality; and modern nations inherit also from the Empire, surviving though transformed, the notion of a greater whole, containing and limiting the smaller units.

For the moment, in the early centuries of the Middle Ages, we are faced by problems of a more rudimentary kind. The barbarian settlements introduced a form of social organization, a land tenure based on personal service, which carried with it certain powers of jurisdiction, capable of almost indefinite extension, and contradicting in essence the theory of civic duty which the Greeks and Romans had laboured to construct. This feudal system had its root in the notion of a personal tie or contract which bound the free warriors of the Germanic tribes to their leader in battle. The ‘ count ’ or ‘ comes ’

was one of a band of personal followers of the king or duke, and after the occupation of the invaded territory he became endowed with land, a fief of his own, on condition of swearing the vassal's oath. This was the origin and simplest form of the theory which in the later Middle Ages was elaborated into a complete legal system, embracing the whole society, towns, corporations, religious as well as secular, and assigning every one his position in a minutely adjusted hierarchy of persons. Obviously such a system represented in itself no higher stage of social unity than the Greek or Roman republics, or the equality of the Empire. Rather it broke up the various unities which had been arrived at, and introduced transverse divisions and interests, which honeycombed the state. But indirectly it served a wider end. It threw into stronger relief the unity of the ecclesiastical order, in which the most characteristic elements of the Middle Ages were embodied. Its very defects left free play to the religious spirit and the religious organization which for the first time in history was constituted as an independent power, challenging in its own right the power of the state, and able to advise, to criticize, and sometimes to control.

How did this new religious power arise?

We noticed towards the close of the philosophic evolution of Greece the appearance of a wider conception of society than had been associated with the city-state of Plato and Aristotle. The Stoics also were spiritual descendants of Socrates, but, with the widening of human intercourse during the last centuries B.C., they had put forward a wider notion of human society itself.

They talked of the 'Inhabited World' as the natural fatherland of the man who lived according to nature. Citizens of this state would meet on equal terms, whether rich or poor, bond or free. A moral system of this kind, high-minded and severe, without hope and without moving passion, floated more or less vaguely in the minds of the best and most cultivated men in the best years of the Empire. Without any consistent doctrine or the sanction of revelation, it inspired a simple humanity and taught fortitude and self-control to a larger number than had ever attached themselves to the older philosophic schools. The gods, too, of the old Olympian pantheon had long been fading before the wider conceptions of a rationalizing mind. The time was ripe therefore, and the seed, which was to fructify in a well-tilled soil, was blown in from the East, from the nation which, alike in so much of its early fortunes to the Greeks, had, while the Greek mind was busy with all the problems of the universe, cherished its one treasure of an ethical religion, based on the authority and direct revelation of one God. The second message of the Jews, spoken this time to all mankind by the Messiah whom they had been taught to expect, fell on the Western world, when the fusion of Greek and Roman was complete, and their joint energy was running out, when kindred ideas to the new gospel were already current, when the one thing needed was a compelling passion. Little wonder that to Augustine, to Dante, to the orthodox philosophic historian of all ages the coincidence meant the manifest hand of God.

To Dante the triumphant progress of the Roman Eagle, which he describes in the sixth canto of the

Paradiso, led all the way to the establishment of the spiritual empire of the Eternal City, of which the pagan power was but a prelude. Historically, when in the first century A.D. the new religious organization sprang up, its centre gravitated inevitably to Rome. It was the centre of all communication, the city whose prestige was indispensable for a Church which was to cover the civilized world. Thither the chief of the apostles had gone to martyrdom. Later, when Rome lost its political prerogative, and still more, when in the fifth century there ceased to be an emperor in Rome at all, the Papacy continued to thrive, and prospered by the removal of the temporal power.

It was just a century after the disappearance of the last Emperor of the West when Gregory the Great established the Papacy as a centre of European influence, independent by virtue of its territorial possessions, respected for the doctrine which it preached and for the general wisdom and moderation of its judgement. The Pope continued to profess submission to the surviving Emperor of the East, and thus maintained the fiction of a united empire, while by the conversion of England, and through England of Germany, the area of the new religious empire was actually extended. And here we touch one of the main services which the Church rendered to the world, which had not been, and could not be, possible for an organization aiming at universal jurisdiction and political control. The missionaries of Gregory could penetrate where the legions of Augustus had been destroyed, and thus the new spiritual power, starting from the vantage-ground which Roman organizing skill had prepared, was able speedily, by the less cumbrous

machinery of persuasion, to enlarge the area of Roman incorporation.

In countries, such as England and Germany, where the Christianizing of the people was the direct result of papal action, the authority of the Pope gained fresh support. They helped powerfully to turn in his favour the tide which for centuries was wavering all over Europe, first between the local Churches, as represented by their bishops, and the general religious authority of the Roman See, and, later, between the spiritual authority as a whole and the temporal power of kings and emperors. The first movement was steadily and surely determined in favour of the Roman See by the logic of the system: the Pope became before long supreme in his own sphere over all spiritual powers and causes. The second case, the conflict between the rival powers in Church and State, could not be logically settled, and the stages in the struggle, its crisis, its triumphs, its compromises, form landmarks in the history of the Middle Ages. We shall only touch on them where they appear to illustrate our main theme; but their very existence and the importance they are bound to assume in any connected and general narrative are proof enough that we are right in seeking in the religious spirit, and the organization which embodied it, for the characteristic and determining factors of the age. Another point follows. It would be a grossly erroneous view to regard these conflicts as merely or mainly the expression of personal or political rivalry. Behind the popes as protagonists—and well expressed by the best of them—was the force of a widespread conviction, a spiritual fervour,

of quite another order than the struggle for aggrandizement which was often the external mark of papal policy. Here was the soul of the system, the element which it added for all time to the minds of men. It inspired the noblest voices through all these centuries, St. Bernard's, who made popes and reproved them for their pomp and pride, and Dante's, the poet of Catholicism, who puts the corrupt popes into the depths of hell.

From Gregory I, the first great founder of the mediaeval Church, to the crowning of Charlemagne, the story turns mainly on the growing friendship between the rising Papacy and the rising power of the Franks. The Franks beat back the Mohammedan invaders of Europe and defended the Pope in his own country. The Pope repaid their service by crowning Charlemagne, the greatest of the Franks, as a new Emperor of the West. This point, though not the culmination of the Church's power, was always the most attractive to mediaeval eyes, as realizing most perfectly the ideal of theorists, the complete alliance of God's two vicegerents on earth, the master of the sword and the master of the soul. It was but a fleeting glimpse of the ideal, for Charlemagne's empire, the fruit of exceptional energy and genius, fell away with him, and, though cherished for centuries as the most perfect type of government, it was not, to a more far-seeing vision, the order of things which Europe most needed to establish. Unity in the general direction of men's minds, but local concentration in their institutions and customs, this was the task and labour of the age; and Charlemagne's exploit was chiefly valuable as helping the Papacy to another stage in its progress towards

the commanding position of the eleventh and twelfth centuries. Alfred, our English Charlemagne, contributed to the same result a century after his great prototype, by converting the Danes whom he had conquered.

But before the papal climax was reached the greatest of the popes, the seventh Gregory, or Hildebrand, had purified and strengthened the institution by his reforms. We have now to consider their justification. Their effect was marred by Hildebrand's excessive ambition and over-reaching statecraft.

The question at issue between Church and State in that age was this, to secure that the agents of the spiritual power should be sufficiently independent to carry out those functions which, as we assume, were of a high social and moral value. The opposing princes contended that government would be impossible if the most powerful and often the wealthiest class in their realms were free from the ordinary rules of order and allegiance to them. The question was incapable of any complete and logical solution, and the Papacy used it constantly to push the most extravagant claims, leading in the extreme form to the assertion of a universal supreme sovereignty. But this should not blind us to the real need which was the basis of the papal claim, and gained for the popes the general following which they so often had, as well as the advocacy of leading churchmen and thinkers, until the decay of the fourteenth century. The Church was there to keep before men's eyes another ideal of conduct and social unity, in the midst of habitual warfare, rough living, and selfish aims. Corruption within was only too easy and too frequent; if besides it had become entirely dependent on the very men whom it was

its business to correct, it would have dried up from the roots.

The princes who succeeded Charlemagne in the eastern part of his domains continually encroached upon the freedom and self-government of the Church. These were the German emperors who kept alive the idea of an empire, Holy as well as Roman; but being weak politically, they badly needed the support of their ecclesiastical vassals at home. Holding the most eminent political office in Europe, on the least stable basis of national strength and unity, they were driven by every motive to assert their rights against the Roman See as strongly as possible. Hence the struggle which the mediaeval theory brought with it, a titanic duel of centuries between Pope and Emperor.

Hildebrand was the most powerful leader whom the Church party, in its earlier struggle for reform, produced. Within the Church he carried out disciplinary measures of the strictest kind, enforcing celibacy on the clergy and pure elections to Church offices. And in the contest with the temporal power he pushed the papal claims so far, and for a time with so much success, that his position at the end of the eleventh century became the standard of the high papal party. A hundred years later, Innocent the Third, following the same lines, succeeded in establishing himself as actual suzerain over a large part of Europe, including our own country.

The rise of this new strange form of domination had been slower than that of empires won by the sword; but its fall was precipitous. Long before Luther broke the Christian world in two, the Roman See had lost its position as supreme arbiter of the states of Europe.

A hundred years after its zenith under Innocent the Pope was a prisoner in the hands of the French, and when in the fifteenth century his outward prestige was restored, decay had already set in beneath the throne. The rise was slow, for the new power had to find fresh channels for its influence and cover areas untouched by the old Roman sway: its fall was rapid, for the doctrine on which it rested absorbed, as we shall see, towards the end of its evolution, elements that brought with them the seed of decay; and the non-spiritual power, the personal authority in state affairs which the great popes asserted, was in itself an overbearing and unnatural thing which provoked a violent reaction.

All this is easy enough to see in the calm perspective of seven centuries: it is more difficult, though more necessary to discern what was behind this papal autocracy, the fresh factors in the general mind of Catholic countries which were of permanent value in building up a collective human purpose in the world.

It will be noticed at once that the four or five most striking products of the Middle Ages followed immediately upon the Papacy attaining full self-consciousness. Immediately after Hildebrand, before the eleventh century was out, the Crusades had begun, at the instigation and under the guidance of the Pope. The next century saw the beginning of Gothic architecture and of the universities. The early thirteenth, the preaching of the friars and the formulation of the scholastic philosophy. Within a century indeed after the height of the conflict between Hildebrand and the Emperor Henry, all these things, the most characteristic fruits of mediaeval civilization, were in

flower. They were all things of infinite value, both in themselves and for what they left behind, and in every case they were directly inspired by the religion of the age and under the control of its chiefs. The point is obvious. We will give the few words available to pointing out how in each case the movement was the result of this general tendency of the mediaeval mind, the effort to bring all the world it knew into subordination to one supreme religious end.

The Crusades, marred as they were in so many cases by greed and vice, ill-managed as they invariably were and futile in their immediate purpose, exhibited the nations of Europe acting together for a common end as they had never done before. The Roman soldiery was a paid profession, and long before the break-up of the Empire it was impossible to find men enough within its borders to serve in its defence. The Crusaders were volunteers, and, while the religious fervour lasted, they were ready, from every country, in unlimited numbers, to leave their homes and face undreamt-of hardships, with but a faint hope of return and no certainty except through faith. Religious mania you may say, or the fear of hell, playing on the minds of men accustomed to a life of hardship and war. Partly, but very partially, true. Many of the Crusaders were quite unwarlike, and many were saints, and the crusading spirit lasted on through various transformations, in the war against the Moors of Spain, in the discovery of the New World, the wars with the Turks, and the many social crusades of our days.

It has been often shown, that by the Crusades the mind of Europe was also widened and aroused. Wealth and

knowledge of other men and countries flowed into Western lands, where the horizon had been for centuries dominated by the baron's castle and the Church; and men of different ranks in the feudal hierarchy, who had charged side by side in the service of the Cross, must have learnt on returning home that doctrines of brotherhood which before had often seemed to belong only to another world, might have their applications in daily life.

Gothic churches, which are the chief visible witnesses to mediaeval life and thought, followed the beginning of the Crusades. They cover Catholic Europe and speak as eloquently of the men who raised them as the pyramids do of the ancient Egyptians or the Parthenon of the Greeks. Their art, with its infinite variety and loving care in detail, its firm substructure and its soaring heights, teaches us, more than all the books, of the character of architects and builders, donors and worshippers. But we refer to them here as another illustration of the depth and wide extent of that new unity in men's minds which the Catholic discipline had induced. From Ireland, Scotland, Scandinavia, Germany, to the old strongholds of Rome in the south, the evidence is the same, of common ideas, of readiness to make vast sacrifice of toil and money for a common worship, of agreement in all great points of style and spirit. A map of Europe, in fact, showing the area covered by Gothic churches, compared with the area containing Roman aqueducts and amphitheatres, would be a chart of the evolution of modern Europe and the further consolidation of the West.

Let us see what light the new monastic orders throw on the same point. Franciscans and Dominicans grew

up side by side, and both were authorized by Innocent in the height of his power. A comparison of these with the old monasticism should give some measure of the advance in Catholic thought and organization since the first hermits of the Thebaid. St. Anthony, the earliest type in the third century, St. Benedict, the Italian of two hundred years later, St. Dominic, the Spaniard of the thirteenth century, stand for the three great stages; for St. Francis, although his order became the most numerous and famous of all, rose like a star apart. In each of the three types there is the same root-idea of personal sacrifice, of separation from the pleasures of the world, and the devotion of all one's powers to something supreme, beyond the world of sense. But see how a widening social outlook transforms the solitary ascetic into the missionary agent of a world-wide power. St. Benedict suppressed bodily mortification and enforced life in a common house and prayer and above all work; and from this type of monk came the first great pope, Gregory the Great, in the sixth century. In the last stage, to which in principle all later orders belong, the monk became in name as well as in spirit a friar or brother, and his order was approved by the head of the whole Church. He was a soldier and an emissary, sent east and west to spread the truth and gain adherents to the greater society of which his own was but a branch. His personal sacrifice becomes a part, and an infinitely small one, of the order and purpose of an all-embracing scheme, eternally planned and eternally efficient. His single lamp of faith and love is merged in that ineffable glow of light and happiness which radiates in Dante's circles of the blessed.

We are passing gradually in our illustrations from the more concrete manifestations of the mediaeval spirit to the more purely abstract and intellectual. The universities, therefore, with their scholastic philosophy, come last. In point of time, too, they are its latest and most perfect fruit. In the history of thought indeed the mediaeval period means the elaboration of scholasticism, and St. Thomas Aquinas, whose life exactly fills the two middle quarters of the thirteenth century, is the final voice in Catholic philosophy. In this sphere he is still authoritative, but we notice it here only so far as it throws light on the nature of that further discipline which Catholicism was imposing on western Europe, collectively and individually, while for the most part the scientific spirit was lying dormant.

Two points are clear which bear directly on the main thread of our argument. One, that at the close of the Middle Ages man was not on the whole better equipped by his knowledge of the laws of nature than he was in the hey-day of Greek science. Isolated improvements had been here and there effected by the Arabs and the Hindus in numeration and the beginnings of algebra, and Roger Bacon had made some marvellous anticipations of experimental science. But, broadly speaking, the intellectual standard of Europe at the end of the thirteenth century, after the death of St. Thomas Aquinas and just before Dante wrote, was not so high, on the purely scientific side, as that of Alexandrian Greece in the second century B.C. St. Thomas, the greatest of the schoolmen, expounds and adapts the theories of Aristotle, so far as they are consonant with the revelations of Scripture.

But on the other side of the picture, we see the social force and unity of the vanguard of mankind immensely strengthened by the process of these unscientific centuries; and this development was no less essential to the coming conquests of mankind than scientific knowledge itself. When at the Renascence the spirit of inquiry awoke again, it spread as rapidly as it did, and won triumphs both in thought and action, largely because in the interval a wide and compacted social area had been prepared by mediaeval discipline, compared with which the sphere available for Alexandrian science was limited and feeble. And this strengthening and binding discipline must be reckoned with, not only as it affected society collectively, but also in its results on individuals. May we not believe that, besides the formation of a stronger and more homogeneous western Europe, a stronger and more harmonious type of European character had been cultivated by the Catholic régime? As in the early Roman Empire historians have misled us by lurid pictures of isolated acts of infamy and misrule, so in the Middle Ages, especially when dealing with the faults of prominent men and institutions, the attention is apt to dwell unduly on the plague-spots and the dirt. The great and widespread art of the cathedrals proclaims the contrary, and the strength of the Renascence itself in art, discovery, and science. Both the stimulus and the repression of the mediaeval doctrine and discipline had borne fruit, whatever were its evils and limitations.

We can best appreciate the nature of this stimulus and this restraint from the writings of the systematic thinkers

who came at the end of the evolution and summed up its ideal tendencies, above all in Dante, who added the insight of a poet and the force of a great character to all the learning of the schoolmen.

Comparing it with the spiritual state of the Greco-Roman world towards the end of paganism, the feature which most impresses us in the Catholic order is the unity of belief and religious practice which it imposed. Where rival deities and cults had been contending in rich variety and without restraint, the Church substituted one system, slowly elaborated from the simplest origin, admitting by degrees the metaphysics of Plato and the logic of Aristotle, but always, until the disruption of the sixteenth century, one in form, harmonized by intellects, from St. Augustine onwards, fully equal in acuteness and comprehensiveness to all except the very greatest of the Greeks. As a work of organization, proceeding with equal steps on the theoretical and the practical side, it is unquestionably the masterpiece of co-operative skill in the history of the world. As such it gives the key to the greater compactness of the society where it reigned; and when we look at the body of doctrine itself we can understand something of the strengthening and harmonizing power which sent men to die gladly at the ends of the earth in order to bring in others to the realm of certainty and love.

For in Christian theory there had been, from the moment of the Redeemer's birth or death, another society founded, in which the temporal distinctions of rank and wealth were unknown, and which would ultimately redress them, in which the bond was love and its basis the

certainty of faith. The social unity of all mankind, the common action and purpose of the universe, which had, as we saw, been floating as vague ideas before the eyes of the later Stoics, became articles of faith, guaranteed by the most powerful organization in the world. Scripture and Aristotle combine in Dante's *Paradise*, as in St. Thomas before him, to demonstrate that there is one principle which rules the heavenly bodies in their certain courses and by the same law the souls of men. As surely as we see the former revolve in their orbits, so surely is mankind created to work together for the salvation of all. They go, St. Thomas tells us, to their appointed end of good living, as the arrows of a divine bowman who cannot miss. His goal is distant and unseen by mortal eye, but reason demands it and revelation has made good the claim.

So much perhaps might have been possible to a pre-Christian thinker. But in the highest heaven of Dante we hear a closing note, which with the others makes a full chord which had not sounded before the Christian era. The same one Principle, he tells us, which governs the spheres and guides men to salvation, is ' Love which rules the sun and the other stars '.

To bring together the two realms of man and nature under one Law of Love, this was the ideal purpose of the new order and explains its force in spreading and strengthening the social unity of western Europe. In spite of countless failures and constantly recurring errors, much has already been built on this foundation, and the future, while bringing fresh elements to the fabric, will build still more.

7

THE RENASCENCE AND THE NEW WORLD

Next to the discovery of the New World, the recovery of the ancient world is the second landmark that divides us from the Middle Ages and marks the transition to modern life.

LORD ACTON.

All through the silent centuries of the Middle Ages there had been here and there, in monasteries and cathedral schools, isolated students of pre-Christian books. Being in the realm of the Roman Church, they studied mainly Latin writers, and Virgil in particular enjoyed a singular immortality. The Greeks, too, were never quite forgotten, and in the capital of the eastern Empire there was throughout an active centre of Greek speaking, Greek writing, and, in a debased form, of Greek ideas. But the most vigorous intellectual life in the West, until the thirteenth century, was undoubtedly that sustained by the Mohammedan power in Spain, which cultivated all the arts and sciences, and restored to Europe something of the Greek philosophy which it had forgotten. To the Arabs of that period we owe not only several advances in mathematics and medicine, but the knowledge of Aristotle, which was to play so large a part in the development of the scholastic philosophy and all that it involved.

But towards the close of the Middle Ages, before Dante's life at the opening of the fourteenth century, two great movements had taken place which did much to quicken these smouldering fires and arouse further study and bolder thinking. These were the Crusades and the universities. Each in a different way laid Europe under a debt to the East, the universities for a large part of their science, the Crusades for half their chivalry. And each movement, while from one point of view a culmination of the Catholic-Feudal spirit, was in another aspect

the beginning of a new age, for each brought with it the seeds both of decay and of new growth.

The first step necessary for the Western mind, about to enter on the period of its great expansion, was to realize that there was a world of knowledge and activity, a world in time and a world in space, outside the area which the Church had guarded and cultivated for a thousand years. The study of the ancients, which the universities encouraged, revealed the world of history: the Crusades were the first general step towards the discovery of New Worlds, east and west. These were the turning-points of the Renascence. One was the method of study, the other the method of travel, then, as now, the two unequalled agents for widening the mind. The progress of study dissipated the notion that Aristotle and Plato were Christian apologists, born out of due season: and other minds, weighing the pros and cons of Catholic doctrine as conscientiously as St. Thomas, could not always come down on the orthodox side of the argument. In the world revealed by travel visitors to the East discovered other views of religion than their own, but consistent both with a civilized life and a high standard of thought and morality. Such was that strange parliament of religion which Friar William addressed on the steppes of Tartary in the middle of the thirteenth century, and reported to St. Louis.[1]

[1] 'Mangu Cham, emperor of the Tartars, in the year of our Lord, 1253, when the lord King Louis of France sent Brother William to Tartary, said to the Christians assembled before him in the presence of the said friar: "We have a law from God delivered by our divines, and we do all that they tell us. You Christians have a law from God through your prophets, and you do not do it."' See Bacon's *Opus Majus* (ed. Bridges), i. 400. Also the report of William Rubruquis himself.

From both these sources, then, the ferment grew which, by the beginning of the fourteenth century, had initiated that progressive movement which is marked in our current histories by titles in crescendo, Revival, Renascence, Reformation, Revolution, all words beginning with the prefix implying change, until we come down to our own days, when possibly we may discover that a name with a deeper shade of meaning is becoming needed.

The Renascence recalls us to the main thread of our story, and points clearly to the sequel. The contribution of the Middle Ages was on lines so distinctive that they have frequently been described as a period of retrogression, and we have seen that there is some truth in this account; though on the other side of the picture the Catholic discipline of the Middle Ages added to man's wealth and power matter of infinite value which has still to work out its influence in the process of the world. Now, before a general forward movement could take place, the side of man's nature which had suffered under the mediaeval system needed to be made good; and it is this repairing task which is shown as the Revival of Learning or the Renascence.

The former term properly describes the earlier stage; the latter was the more general movement affecting all sides of life. In this chapter we are glancing rapidly at the whole—the three centuries which followed Dante's death, the fourteenth, fifteenth, and sixteenth. With the seventeenth we reach the rise of modern science, as a vigorous and independent growth.

Much of the movement of these three centuries takes the form of violent conflict and destruction. It is easy to allow one's mind to dwell too much on this aspect,

and to let the constructive work, more silent but incomparably more important, pass by unnoticed. This tendency vitiates a good deal of the accustomed presentation of history, which has offered us the wars of religion as the main topic of an age when adventurers were adding a New World to Western civilization, and Galileo's telescope revealing a new universe to mankind. It is easy, too, from the same cause to drop into the belief that the destructive work accomplished in such a period went further and deeper than it did, to imagine a *tabula rasa* where there was really the erasure of a few figures, the putting of an old picture in a new frame. The Pope's authority was destroyed in England and a new Lutheran Church established in Germany, but the moral discipline and the intellectual habits fashioned by the incessant and authoritative influences of a thousand years remained in the mass untouched, and altered slowly, like the building of the earth's strata or the change of species.

That the fourteenth century was a period of decay, after the collective efforts and large construction of the two previous centuries, is evident from many signs. The Papacy had lost its eminence, and was for a large part of the time in exile under the control of France. The new religious orders which had arisen a hundred years before to evangelize the world for Christ and his Vicegerent had become in many cases more corrupt and self-seeking than the laity they were sent out to teach. To this Dante is our witness at the beginning of the century, and Wiclif at its close. The Crusades of the earlier centuries, which had united Christendom for a common religious end, had given place to a Hundred Years' War between the two

leading nations of the West, which devastated both countries for selfish and material ends, and left a legacy of waste and suffering, of mercenary fighting and national enmity.

The ideal of a Christian comity of nations under the joint aegis of Pope and Emperor was thus, in fact as in theory, receding from men's grasp. But at the same moment the study of literature, which the universities had fostered, was leading gradually to the reconstruction in the minds of an *élite*, of an ancient world of art and learning, of enjoyment and of government, outside the pale of Catholic traditions and belief.

Latin was the first channel of this new culture. It was the foundation of half the popular speech of the West and all its religious rites. The starting-point in the new movement was the discovery that under the contemporary superstructure of language there lay hidden an earlier, more polished and perfect building, which man's mind had fashioned many centuries before, and where ordered thought had lived and flourished, untrammelled by the narrow limits of the mediaeval dwelling. Virgil, the poet and prophet of ancient Rome, lived again, instead of the mediaeval magician who had usurped his name. Cicero became the standard of diction, instead of the Vulgate and the schoolmen. The first stage in the Revival is that associated with the name of Petrarch in the fourteenth century. But as in the excavation of ancient sites the unearthing of the first hidden city is often the prelude to the discovery of larger and finer remains beneath, so the revival of classical Latin was followed by the more potent renascence of Greek. Beneath the Roman city a still more spacious

and beautiful dwelling-place for the human spirit was gradually revealed, where Homer and Aeschylus, Thucydides and Plato, had moulded the subtlest thoughts into the most exquisite forms which the world has ever seen. This was the second stage, the Renascence of the fifteenth century, when the destruction of Constantinople hastened the flow westward of Greek books and Greek scholars which had been for some time in progress. By the end of the century the newly discovered printing press had sent out from Italy in the most beautiful dress they have ever worn most of the ancient authors, both Greek and Latin.

But this work of restoration by itself tended to make a pleasure-garden of what was once a busy city. It is not therefore in the literary taste of the Renascence, nor in the renewed enjoyment and expression of the beautiful in art which quickly followed, that we should look for its chief fruits. Precious as was the movement which gave the world Raphael and Michelangelo, its wider and more indirect results must count for most in our present sketch. It gave men increased confidence in their native powers and a determination to seek and inhabit worlds of thought and action beyond the Church's sphere. It inspired them not only to study and enjoy the structures of ancient thought which had been revealed, but to build new cities of their own on larger plans.

The return to Greece, which is the key-note of the movement, suggests many interesting parallels and touches many points of real indebtedness. In the new movement Italy takes the place of ancient Greece. Again an intellectual movement goes side by side with world-activities, with adventures by sea, with geographical dis-

covery, with the eager political rivalry of independent city-states. The north of Italy at the Renascence closely recalls, as Freeman has shown us, the vigorous life of the Hellenic cities in their prime. They have the same intense local pride, the same dissensions, the same readiness to recognize and reward beauty and effort in creative thought. The art of the Renascence is primarily Italian art, and the finest printed books, unequalled since, came from the Venetian presses. The most original and constructive thinking, the work of Machiavelli, of Copernicus, above all of Galileo, was done either by Italians or under Italian influence. Columbus was a Genoese, and the compass which guided him across the Atlantic had been made a practicable instrument by Italian sailors early in the fourteenth century.

Such many-sided activity, coupled with the similar political conditions, takes the mind back inevitably to Greece, and the comparison is a fruitful example of historical analogy. We shall not follow it here, but rather indicate the actual working of the old Greek leaven, recovered and introduced into a new society, wider and closer knit than the old, transformed as we have seen in some essential points, but yet reproducing many features of the old theocracies of Egypt and Asia from which Greece sprang.

There was again, though in another shape and with a nobler spirit latent within, the hardened crust of religious forms and traditions, which, as of old, awaited the irresistible impulse of free and consecutive reason to break and give passage to fresh life. This was the task of ancient Greece, and hence, when men began

again at the Renascence to exercise freely their powers of thought and action, they found themselves at every point working where Greek workers had been before.

Church doctrine itself had of course been also moulded largely by the ingenuity of Greek minds: but at the Renascence men invoked the Greek spirit of an earlier age, before philosophy had turned her back on nature, and the Byzantine theologians had tied up affairs of state with the finest threads they could spin from theological argument.

Examples of the debt to ancient Greece abound in all the special sciences which began to revive in the fifteenth century; we shall only notice here one or two aspects of the indebtedness which have the widest bearing. The name 'humanist' itself which was borne by the scholars of the Renascence, though a Latin word, has the ring of Greek philosophy and training. Man's nature was again to be considered in its completeness, its physical and intellectual sides having due scope, as well as its moral and religious needs. And on the moral side an end was sought in the life of the citizen, sometimes also in the life of individual pleasure, rather than in conformity to any formal religious rules, framed with an eye on another world. Such a change in the direction of discipline brought dangers and evil with it, but at its best, as we see it in the educational system of Vittorino da Feltre, it combined the strictness and reverence of a sound Catholicism with the breadth of view and open-mindedness of a new culture which was older than the Church itself. Vittorino is a notable figure in the movement, not for any originality in his ideas, but as a representative man, combining both Latin and Greek culture

and covering in his lifetime the later fourteenth and early fifteenth centuries. He preserved in his school the old knightly idea of physical training by hunting and martial sports, but he added to it all that Greek and Latin letters could at that time afford, and, by preferring mathematics and astronomy to the schoolmen's logic, showed how much nearer the humanists were to the Greek than to the mediaeval scheme of knowledge. This was before the printing press had spread the knowledge of Greek, or the fugitives from a Mohammedan Constantinople had increased the number of its apostles. The latter part of the fifteenth century gives more abundant evidence, in the nature of its art, in the spread of 'academies', in the translation and adaptation of Greek books. Johann Müller, a German who studied Greek in Italy, applied his literary knowledge of Greek to the advancement of science. He translated the works of Ptolemy and the *Conics* of Apollonius into Latin, and returning to Nuremberg, founded an observatory, where he produced his 'Ephemerides', or nautical almanacs, based on Ptolemy, which enabled the navigators of the succeeding years to travel unknown seas. Later again than Müller we have Copernicus, the Pole, studying astronomy at Bologna, and imbibing there the Pythagorean notions of the sphericity and movement of the earth, to which he tells us he owed the first glimpse of his own theory.

Thus by the end of the fifteenth century the reinfusion of the old Greek spirit into western Europe was in active process, and we reach the year 1500, which, like so many turning-points between the centuries, stands for a real climax in human affairs. Gutenberg's printing

press, transferred to Italy and used in the service of the humanist revival, had already, in the first fifty years of its existence, issued all the leading classical authors, and put in currency the vivifying ideas of Greek philosophers and men of science. The work of the navigators had achieved its crowning triumph, and Columbus had brought back the news and some of the wealth of the New World. Copernicus, teaching mathematics and studying astronomy in Italy, had conceived his great idea, which was to transform men's notion of the material universe. And 1500 is midway in the life of Erasmus, who best exhibits for us the views and feelings of a wise, learned, and cautious man, surveying the course of events at that critical moment with a heart set on the progress of human happiness and knowledge. The world was getting larger; in extension, both East and West were being brought into contact with western Europe, the old nursery of the highest civilization of the globe, and, intensively, the growing mass of knowledge was pressing on the shell in which the discipline of the mediaeval church had encased both life and thought. Cautious wisdom hoped that the old forms would yield gradually and adapt themselves to the new growth. We recognize now that larger forms were needed, and that true continuity is to be found not in the history of any political or religious organization, but in the strengthening of the general social and spiritual force of mankind, in the deepening of man's powers over nature, and in the knitting closer of all the members and branches of mankind throughout the world.

But surveying the scene as Erasmus did, we too might

well have hoped and worked for an issue free from the loss and conflict of the sixteenth and seventeenth centuries, we might have thought that knowledge would spread within the limits of the old order, and the world be civilized according to the Catholic idea, with the Pope as centre of spiritual and intellectual life, harmonizing the worldly ambitions of the temporal powers. Still more, if any thinker in that age could have foreseen the horrors of the religious wars, the rage for gold, the devastation of the new lands in the West, he would certainly have desired and striven to preserve some source of moral and spiritual authority which might check the evil. But the supreme spiritual power then enthroned was impotent, either to purge the Church of the evils which led it to disruption or to conduct the settlement of the New World on humane and civilizing lines.

It is fortunate for a 'progressive' theory of history that we are not required to believe that what happens is always the best that could have happened. Looking back now from an age when the whole planet has been explored and knit together by steam and electricity, when not the Church but its monopoly has been destroyed, when a compact fabric of scientific knowledge stands supreme in the intellectual world, we have not to ask what might have been, nor how we might have desired or forecast it, but what these three centuries of the Renascence actually contributed to the results achieved.

Erasmus lived at the height of the crisis, on the high dividing land from which the waters were flowing rapidly into the ocean of modern life; he could not discern all the channels which that flood would take, though he knew the main current and faced the future. If we take

another step forward, and ask what had been accomplished by the beginning of the seventeenth century towards the attainment of the modern goal, we may be able with some clearness and certainty to distinguish a few large features. We may put first, as Lord Acton does, the discovery of the New World which preceded the outburst of science in modern times, as the colonies and trade of the Greeks did in the ancient world. Next in order of the results of the Renascence—understood, of course, in its widest sense—would come the disruption of the Church, accompanied, on the one hand, by a strong revival of spiritual life, both in the dismembered Church and in the new churches formed from it, and, on the other hand, by an increase of national and state authority, especially under the leadership of vigorous monarchs such as the Tudor house in England. Last, but ultimately most important of the results, would be the foundation, by the beginning of the seventeenth century, of modern science, achieved by recovering the work of the Greeks, and adding to it a stricter and wider use of observation.

It will be seen that all these movements have a close interrelation and common roots in the general awakening of men's minds in western Europe, and all of them tend, though by various courses, to the common end of a united human force, subduing and civilizing the world.

The voyages of discovery which led, with Columbus, to a New World at the end of the fifteenth century, had been proceeding with increased skill and daring for over a hundred years. They began with the Crusades, and had in the earlier stages much of the crusading spirit. The north-west corner of Africa was the spot where the navigators, who were afterwards to reach India and

America, first learnt their business. Here Genoese and Portuguese seamen disputed with the Barbary Moors for the glory of the Cross and the conquest of the Guinea coast. This coast was to the Saracens the ' Bilad Ghana ', or the Land of Wealth, and the wealth consisted in the first instance of negro slaves, for whom the ships of Prince Henry of Portugal pressed down the coast and watched the shores. But behind the kidnapping of the blacks there was in Prince Henry's mind the larger idea, partly religious and partly political, of founding a great Christian dependency for Portugal on the banks of the Senegal. In 1445 his ships at last reached that point, the furthest aimed at in the earlier period, discovered a great river flowing from the east, and brought back a good cargo of negroes to their master. It was just at the moment when the Christians of Constantinople were making their last desperate appeal to western Europe for help against the Turks, and Gutenberg's press was issuing the first printed document we know of, an indulgence from the Pope for all who would volunteer for service in the East.

But Prince Henry's more lucrative crusade had also a religious link with the East. It was supposed that the Senegal was a western branch of the same waters which flowed to the Mediterranean by the Nile, and that by this means communication might be set up with the Christians of Abyssinia, and a great Christian kingdom established in the south, to balance and hem in the Mohammedans of the north of Africa.

So far the wider notion of circumnavigating Africa and trading with India by sea had not occurred. But

in the forty years which followed a great change came. There was a continual extension of the trading spirit and a growing boldness in navigation, and the study of the Greeks, helped by the printing press, placed better science at the service of seamen, who had by now acquired sufficient confidence to make use of it. These forty years saw the Portuguese push further and further south, adding an 'Ivory' and a 'Gold' coast to their slave-raiding centres, and varying their sources of wealth. At last, in February 1488, Bartholomew Diaz, partly by accident, partly by the bold facing of unknown seas, rounded the Cape and looked across the Indian Ocean, about four years before Columbus set sail from Palos.

All through the century which preceded the most famous voyage in history, and especially in the latter part of it, after the invention of printing, the science of geography and the art of map-drawing had been developing rapidly, and the recovery of Ptolemy's works was the most powerful stimulus. The knowledge of them in the West began early in the century, and various translations and adaptations, and extensions of the maps which they contained, were made, until in 1474 Toscanelli produced the chart which was to suggest and guide the voyage across the Atlantic. Nothing could illustrate better the difference which the restoration of Greek science effected in mediaeval ideas, than to compare the projection of Ptolemy, based on the measurements of Hipparchus, with the maps of the Middle Ages, such as the very curious and complete one preserved in Hereford Cathedral. In the former, if we correct one serious mistake in the length of a degree of longitude, we have a substantially accurate

delineation of the world as known at the time, set out on a consistent plan based on measurements of latitude and longitude. Here are the essentials of a scientific treatment of the subject. In the latter we have an arrangement, partly ideal, partly picturesque, of all the places and people whom the author happened to have heard of, and to think of interest, circling round Jerusalem as the divine centre of the world. It was not until the positive had replaced the picturesque as the guide to knowledge that the age of great discoveries could begin. Columbus, as we know, accomplished his task and finished his days in the firm belief that he had reached the eastern shore of Asia : but the new truth that possessed him far outweighed his error. He realized for the first time, and lived in the belief, that the earth being a sphere, you are bound to come at last to the east if you go far enough west, and that the right direction is to follow the latitude in which your goal is placed.

But the crusading spirit had still a large share in Columbus. The Spanish sovereigns were reducing the last stronghold of the Moors when Columbus was soliciting the help of one European monarch after another, and it was not till after Granada fell, in January 1492, that Columbus received his commission. Then he went out under the flag of a united and triumphant Catholic Spain to subdue fresh lands and people to the faith. The coincidence brought Spain into the field and broke the monopoly of the Portuguese, who had been playing with Columbus's plans and followed his expedition with jealous eyes. Thus in another sense the voyage was a turning-point, for it marks the change to exploration of which

the search for gold and competitive commerce were the dominating motives. The wealth of the Spice Islands in the East, and the flood of gold from Mexico and Peru, weighed down the balance, and Columbus became the last of the crusaders as he was the first of the great scientific seamen. In 1493 the Pope was asked to define the new sphere of oceanic enterprise between the leading competitors, Portugal and Spain, and the line drawn gave Brazil and all east of it to Portugal, and the West to Spain.

The next century was to see another form of arbitrament, a fight for power at sea between Christian nations, fiercer than the old Crusades.

After Columbus's first two voyages discoveries followed in quick succession. Within four years the mainland had been touched, and Cabot, another Genoese, who had independently of Columbus conceived the idea of reaching Asia by the Atlantic, had discovered Newfoundland. In the same year as Cabot's voyage Vasco da Gama had crossed the Indian Ocean and set up the Portuguese flag at Calicut. In three years more Brazil was occupied, and in 1516 the Pacific was sighted from a peak in Darien. In 1521 Cortes entered Mexico, and in the following year Francis the First, anxious that France should have her share, commissioned an Italian seaman to survey the coast of North America from Florida to Newfoundland in his name. The rush was breathless, and the effect on men's minds at home widespread and profound. In 1516, the year in which a European eye first looked on the Pacific, Sir Thomas More published his *Utopia*, the narrative of an imaginary traveller who had stayed behind

in America after Vespucci's voyage of a few years before, and had made his way home by the western seas, as Magellan actually did six years afterwards. On his way home by this untraversed sea, More's Hythlodaeus discovers an unknown island, where men were living a happy communistic life, following learning and eschewing war, free from the evils and superstitions of the Old World. It is the spirit of the literary Renascence at its best, critical and awake, stimulated by the new discoveries, but rather looking back to Plato, as Bacon's Utopia of a hundred years later looks forward to the future and the triumph of modern science.

Before Bacon wrote, the great awakening had gone much further, and had brought some results in its train which would have surprised the men of 1500. The bulk of the wealth derived from the new discoveries went, by the accident of Columbus's commission and the Pope's award, to Spain. Already, before the gold and silver of Mexico and Peru had begun to flow into the Spanish coffers, the disruption of the Church had taken place, and the Spanish king, the Emperor Charles V, who was at the head of the largest domains in Europe, as well as Holy Roman Emperor, became by conviction and position the champion of the old order. The spread of knowledge and the peaceful reformation from within, which Erasmus had worked for, had proved impracticable, and most of northern Europe, with Luther as the national voice of Germany, was arrayed outside and against the Church. Such was the state of Europe when the wealth of the New World was thrown into the scale. The position of France and England was as yet undecided. It seemed

as if the hand of God had blessed the last crusaders, and was supporting with inexhaustible resources the cause of the Holy Church and Holy Empire. But the event was otherwise. The goal of a common human society, working together for the conquest of nature and the improvement of life, was not to be reached so easily: for this voyage it was not sufficient to take a straight line across the untravelled sea, sure that if the one direction could be preserved, you would come to land at last.

Ultimately the New World was to prove one of the strongest links of human unity, lying, as it does, geographically midway between western Europe and the oldest civilizations of the East, and affording in its wide expanses opportunity for diverse races and religions to shake off readily any traditions and prejudices which had proved obnoxious in old surroundings, and to settle with amicable freedom and sufficient space. But immediately it added fresh matter for dispute to the rival powers of the awakening and aggressive West.

Both France and England were inevitably drawn to challenge the overbearing strength of Spain, and in England the fight was more decisive, for her firmer stand on the religious question made the issue appeal to every element in the national spirit. The story fills the latter part of the sixteenth century, and remains the most stirring epoch in English annals, only surpassed by the story of Holland, who made her own challenge and won her own victory over the common foe of freedom in the decade before the great Armada. In Holland the struggle was more heroic, for a country no larger than Yorkshire was in revolt against its hereditary masters, the masters

also of the wealth of the New World. Philip the Second who had succeeded Charles as head of the Spanish dominions, just three years before Elizabeth came to the throne of England, continued the policy of his father with a smaller nature and blinder fanaticism. He had less capacity for understanding the beliefs and ideals of others, more unreasoning obstinacy and foolish confidence in the power of mere money. The Dutch revolt under William of Orange gave to the modern world the same example of national freedom in government which the Greeks had given to the ancients. It was indeed in some ways a greater feat than the Greek repulse of Persia, for the Persians had never been the acknowledged rulers of Hellas and the Greeks were better able to defend themselves at sea than the Dutch. It was a more disinterested fight than ours, for conquest to us meant sea-power and a share of the Spanish trade, even more than freedom, and Spanish galleons were first and foremost treasure-ships.

In 1584 William fell by the bullet of an assassin sent out by Philip, but the freedom of Holland was really won; and four years later the defeat of the Spanish Armada dealt the death-blow to Spanish power at sea.

France, under the ambitious leadership of Francis the First, had been anxious to secure her share of the New World. Francis had claimed the coast of North America, which he had surveyed, and called the country New France. French settlements were attempted on the banks of the St. Lawrence, and by French Protestants on the coast of Brazil. Frenchmen, too, had taken a share in the plunder of Spanish treasure-ships. But

the religious wars which fill the latter part of the century in French history postponed her Elizabethan period for another generation. It was not till after William of Orange and Elizabeth had won power and national freedom for their countries that France found a ruler comparable to them in Henry the Fourth. Then at the end of the century France took her due place in that balance, or concert, of European states which was emerging from the tumult of the last three centuries as the modern equivalent for the mediaeval empire with its outworn theory and shadowy chief.

This was the issue of the barbarian settlements which had broken up the Roman Empire in the fourth and fifth centuries. The Renascence, with its weakening of the Church, its conflict of the national chiefs with the Pope, the increase of trade and consequent rise of a middle class, and the quickening of national rivalry by the new wealth and settlement of new lands east and west, had brought the slowly moving process to rapid fruition. The change was equally marked in all the leading nations of western Europe, Germany and Italy alone remaining for later consolidation. In them the mediaeval conflict of Emperor and Pope had made rents in the national life which took longer to repair. But France, Spain, and England, however much they differed on religion, agreed in rallying more closely than before round their royal house, and constituting at that period a real national unity which has never since been broken up, and appears to us now to be a natural type of human association, the model of those which have arisen in later years.

The fact is of great importance in tracing the growth of human unity, equal perhaps to that of adding new continents to European ken. For we cannot imagine any firm and consistent relations between men over large tracts of our planet, without stable compact groups in smaller areas. It may seem a truism, but, like many truisms of to-day, it has been established by ages of struggle against manifold difficulties. The system of nationalities, as we know it, is the result of all the historical process of the past, and is still in course of change. But the Renascence was a marked stage in the development. Nothing had been thought of before—or could have been thought of—comparable to the 'Great Design' of a Concert of independent States, a federal European Republic, which was attributed to Henry the Fourth at the beginning of the seventeenth century. It implied the transformation of the mediaeval conception of one empire and one church into something much more elastic, offering more scope for variety, both in government and religion. It arose directly from the revival of Greco-Roman notions of government, in a world where the Middle Ages had impressed a real unity of character and purpose on populations now long settled and attached to a definite fatherland.

The end of the fifteenth century and the sixteenth produced in the three great western states of Europe sovereigns of remarkable vigour and force of character. This was, of course, partly accidental, but largely also the result of feudal and mediaeval conditions, hastened by the new factors which the Renascence introduced. The disorders of the feudal system, illustrated at home by the

Wars of the Roses, and internationally by the Hundred Years' War, came to a climax and a clearance towards the end of the fifteenth century. In England the exhaustion of the country and of the old nobility made the way easy for the Tudors, and their burden light. In France at the same moment Louis the Eleventh, a king of exceptional ability and astuteness, was subduing one by one the insubordinate fiefs which had divided the country and let in the English at the beginning of the century. In Spain the marriage of Ferdinand and Isabella united Aragon and Castile, and the united kingdom added to its prestige by expelling the last remnant of the nation's traditional enemy. These events were synchronous in the different countries, and, in each case and others like them, were accompanied by an active advance in the administration of justice and the foundation of a better centralized and stronger government.

This was the general position when at the crisis of the period, about 1500, the two dramatic events occurred which reacted so powerfully on the sequel. The discoveries east and west, and above all in the New World, further stimulated the ambitions of the newly strengthened monarchs, and brought them fresh wealth and territory. And in 1521, as Cortes was entering Mexico, Luther burnt the Papal Bull and the Canon Law at Wittenberg.

We noticed in the last chapter the doctrine of the Church only in so far as it seemed to affect the discipline and general direction of men's minds which the Middle Ages were imposing on western Europe. In the same way the differences of doctrine which became acute at

the Reformation will only concern us here as strengthening the working of the other conditions which we have described, and giving added force to the revival of energy which was breaking out at every point.

The story of the Dutch Republic and of Elizabethan England shows how strongly reforming zeal fortified the spirits of the rising nationalities; the next century has the shining example of Sweden, and we can hardly think of Germany as a nation without Luther. But it would be a serious error to limit the operation of this cause to countries which championed the Protestant side when the field was set. Like all great movements in a connected environment it worked variously, but with a certain effect on all parts of the area. France, which was for years in the balance, though it found its place ultimately under the politic Henry on the Catholic side, was no longer Catholic in the same sense. The Church became more national, the crown more powerful, and the national spirit was heightened by the struggle. Even Spain, the protagonist of the Catholic cause, became less dependent on papal authority after the movement than before. In this respect, then, we may trace a general effect, a strengthening of the national units of the allied Europe of our dreams. But this is not all. The Reformation, regarded as a deepening of the religious life and a moral and spiritual purification, touched Catholic and Protestant alike. Despite the vices of a later day, the Restoration in England and the Regency in France, there was, after the outbreak of the Reformation, a new and purer spiritual life, a more self-denying zeal in Catholic communities, as well as Puritan, which has never died out

since. The revival and unrest of the Renascence found in this its proper check, in a revival of another kind; for Xavier and Borromeo, Fox and Bunyan, though divided in name, belong essentially to one family, the children of St. Bernard and St. Francis.

It was an age of conflict, to be long continued on many fields. The greater is the need, therefore, to note the common features, the continuity with the past, and the new links forging for the future, for it is by these elements that humanity will grow and gain in strength, when the Thirty Years' War, the St. Bartholomew, the Inquisition, the intolerance of all parties and creeds have been expiated. And perhaps of all the connecting and organic features in the three centuries of the Renascence, the most remarkable was the final rally and revival on the Catholic side, which is commonly called the Counter-Reformation. This has a twofold aspect, both implying a profound community and continuity of feeling in spite of apparent divisions. On the one hand, the Catholic reformation showed the operation in both camps of a similar spirit, seeking a truer moral and religious life. On the other hand, the mass of the population, especially in the southern countries which had been most completely Latinized by the Roman Empire, demonstrated the real vitality of the old beliefs and organization against the powerful motives which drew both kings and nations away from Rome at the beginning of the struggle. France, the central country, was the crucial case. Whereas William and Elizabeth needed a strong and definite Protestantism to gain the full allegiance of their people, Henry was compelled to win Paris by a Mass. In the next century, when, after

the devastating war in Germany, the balance of population and territory was finally struck, it was found to be in favour of the old religion.

The year 1600 serves very well for a pause and a review, for by that time we can see something of the accomplishment as well as the crisis of the Renascence. The main lines of the political and religious settlement had been by then determined, though half the population of Germany were to be destroyed and her progress put back for more than a century in adjusting the details. By 1600, too, the Renascence had justified its special task of setting again on foot the old creative spirit of the Greeks in science and philosophy and all the arts of life and beauty. The new vigour which had come into the world had already revealed another unsuspected hemisphere, and pointed to the true place of our planet in the celestial system. It had already in art produced the finest expressions of the ancient ideal working through Christian minds. In ways of life and speech, the confidence of action and the capacity to enjoy, it had already wrought more change in the civilized world than any period between the Greeks in their prime and the age of inventions which was still to come. The definite construction of modern science comes somewhat later, when the men of the seventeenth century take up the threads, and work out long trains of systematic reasoning in physical science and philosophy. In 1600 Kepler and Galileo had begun, but not completed, their discoveries, and even thirty years later Galileo was compelled on pain of death or imprisonment to abjure his belief in the Copernican theory. And in 1600 it was still possible

for Giordano Bruno to be burnt alive for proclaiming a new philosophy, based on Copernicus, which would sweep away the old scholasticism and build up another conception of the universe, as philosophers have been more slowly succeeding in doing ever since. The beginnings had been made; Tycho's observations had laid the foundation for Kepler; Gilbert had given the first scientific sketch of magnetism and electricity. But the more comprehensive discoveries were yet to come, and Bacon had still to sound the trumpet for a general advance.

It was an age of new life and promise for the future. The greatness of the old world had been discovered, and new wealth, new continents, new ideas were crowding in, which raised high hopes and pointed forward to a modern world which might equal, and in power and size must far surpass, the glory of the old.

The grandest figure, standing, as Dante did, at the close of the period which he most perfectly exemplifies, remains to find his due place here, before we pass to consider the sequel of the great awakening in its more far-reaching effects on society and thought. The year 1600 is a landmark in Shakespeare's life, nearer to his maturity than to his youth, but midway in his richest harvest-time. He, more than any one, reflects all that was best in that age of ardent feelings, vigorous life, and agitating thought; and he transmutes all into the pure gold of immortal and universal art. He gives us the enthusiasm without the party strife, movement and action without destruction, a mind open to the new advance, but with fullest sympathy for all the past. He

sees the simple facts of life, hallowed and surrounded, as men were used to see them, by kingly authority and religious rites. The Church, the friars, the crown, the sceptre, are as sacred to him as they were to all the multitude who accepted them with affection and immemorial reverence. He is Catholic to the Catholics, patriot in Elizabethan England, philosopher in his deep questionings on the nature and purpose of our being.

And above all there rises the characteristic note of the Renascence, proclaiming the supremacy of that 'godlike reason which looks before and after' and must not 'fust unused'. . . . 'What a piece of work is man! how noble in reason! how infinite in faculty! in form and moving how express and admirable! in action how like an angel! in apprehension how like a god! the beauty of the world! the paragon of animals!'

It is a note which comes from a past two thousand years away, and when we hear it, the famous chorus of the *Antigone* rings again.

8

THE RISE OF MODERN SCIENCE

If one were to endeavour to renew and enlarge the power and empire of mankind over the universe, such ambition (if it may be so termed) is both more sound and more noble than the other. Now the empire of man over things is founded on the arts and sciences alone, for nature is only to be commanded by obeying her.

LORD BACON

Shakespeare summed up for us the spirit of the Renascence at its height ; Shakespeare's greatest English contemporary is the best herald of the coming age. For Bacon, too, stands exactly on the dividing line between the centuries, and, while he shares to the full the enthusiasm and the sense of power which the age of discovery had inspired in western Europe, he adds to these the two fundamental traits which distinguish the great founders of modern science in the seventeenth century. One is the critical spirit, determined to sweep away the false Aristotelianism and mere authority which obstructed the progress of effective knowledge : the other, the new impulse to turn to nature as the source and material of truth, and on the truth of nature to build a system for the general amelioration of mankind. Bacon's voice was a trumpet call to both the destructive and constructive tasks, and, though in power of thought and in definite contributions to science he was far surpassed by many of his contemporaries and successors, we may trace his influence in all the sequel.

The new movement, however, was to grow round definite and constructive ideas, which would knit men's minds together as the first discoveries of geometric truth had built up the early structure of science in the minds of the Greeks. Bacon, with all his prophetic zeal, was too much distracted by other interests to take a share in the actual building. He was distracted by his erudition and his literary gifts, and still more fatally by the interests of wealth and worldly success. The actual builders were men of intense and unbroken devotion to the pursuit of

truth. Something had appeared again in the world like that first passion for inquiry, that community of effort in science, which bound together the sages of Ionia, and formed the brotherhood of Pythagoras. From the sixteenth century onwards there was again a class of men in Europe nearer akin to the old Greek philosophers than any who had been seen for nearly two thousand years, men full of interest in the working of the world around them, facing varied problems with equal zest, and accepting no solution but such as their own intelligence could approve. In their close relationship among themselves, as well as in their openmindedness and breadth of interest, these new philosophers recall the old. They corresponded copiously, they issued intellectual challenges and scrutinized eagerly all new ideas. They sought out one another and founded societies, and, with occasional quarrels and disputes as to the priority or independence of their work, they were united in the common hope that the new fabric of knowledge, growing from their labours, would increase after them and be of inestimable value to mankind.

The pioneers in this work, as in that of the revival of learning, arose in Italy. For Italy, as we have seen, offered the first theatre in the modern world for the spirit of ancient Greece to reappear and play her part of intellectual leader ; and the new science was historically, in Bacon's phrase, a ' renewal and an enlargement ' of the science of the Greeks. It was in Italy that Copernicus had lived and studied and taught. There Leonardo da Vinci had applied his insatiable genius to all branches of art and science. Bruno had died there in expiation of the boldness of his new philosophy, the first complete

scheme to dispute the sovereignty of Aristotle. And in the first decades of the century of science Galileo had laid in Italy the foundation stones of modern physics and mechanics by adding a new experimental method to correct and extend the ancient mathematics. But when Italy had rekindled the beacon, there were many heights around to take up and pass on the fire. This the long process of the Roman and Catholic incorporation had secured. France, England, and Germany were now ready, and Bacon and Descartes, Newton and Leibnitz were to spread the light world-wide.

It was an international work, within the area of that smaller progressive world, which Greek intellect, supported by Roman power, had divided from the rest of mankind. Within this area it was shared in common by many minds in all the leading nations; and at every step forward, from Galileo's telescope to Darwin's theory of evolution, it will be found that several were busy on the same problem at the same time, and often the light flashed on more than one independently and simultaneously. The joint effects, which we are now after three hundred years beginning to realize, have given to the west of Europe, and its off-shoots across the Atlantic, the definite primacy among the nations of the earth. In these countries, from the Renascence onwards, the development of human knowledge, and the resulting power and wealth, have proceeded with accelerating speed. Every year the task has become more urgent of holding together these growing forces, and subordinating them to the common good.

The movement will appear, more directly than any

other part of our story, to fit into the evolution of that collective human force which is growing and compassing the conquest of the world. What can be said about it in these few pages will deal with those aspects which have a special interest from this point of view. It will be seen how closely the different parts and actors in the movement hang together, forming a model, as well as a stimulus, to human co-operation, how firmly the whole was rooted in the past, in spite of many outward symptoms of severance and revolt. The scientific method which was now evolved will appear in its essence near akin to that supreme social agent among earlier men, language, of which this special value was noticed in the second chapter. And the applications and concrete effects of the new method will form a large element in all the sequel, from the industrial revolution onwards, wherein that mechanical phase of scientific knowledge which was settled in the seventeenth century, has already enabled men to utilize natural forces and modify their own way of living to a degree unexampled and undreamt of in earlier ages.

The essential characteristics of this development of science were sufficiently well understood by many of those who were actually engaged in promoting it. In the full swing of the movement, while Newton was meditating as a youth on the geometry of Descartes and the *Arithmetica Infinitorum* of Wallis, a meeting of men of science, following on several in Oxford, was held in London, at Gresham College, in 1660, which virtually founded the Royal Society. In the first journal of the Society there is a memorandum, dated November 28, which states that 'amongst other matters that were

discoursed of, something was offered about a designe of founding a Colledge for the promoting of Physico-Mathematicall Experimentall Learning'. This expresses exactly in three words the three essential qualities of the early modern scientific movement, before biology had arisen to claim separate treatment by the Society and a dominant interest in the world of thought. The new learning, or science, which the Society set out to encourage in the seventeenth century, was to rest on experiment, but its main object was to connect the processes of nature with mathematical law. In its object it was following, extending, and improving the methods of the Greeks; by applying experiment it added that necessary condition, for want of which the physics of the Greeks had remained abortive, and they were limited to geometry and the beginnings of statics and astronomy.

While the new scientific movement has this capital advantage over the ancient in point of method, in point of subject-matter it offers both a significant analogy and a significant difference. For two hundred years, from the Copernican controversy till after the death of Newton, the elaboration of mathematics was the leading feature of modern science and its conspicuous success. This was in conjunction with astronomy and physics, which were gradually brought within the scope of the improved methods of measurement: and it was astronomy that first attracted the inquirer in modern times and established his mechanical laws, just as it had implanted the first notions of ordered sequence in the primitive and ancient world. The mechanics of the celestial bodies have thus played the decisive part in the formation of

our scientific ideas; and the progress of discovery has been from the mass, those greatest masses which attract and dominate our vision, to the infinitely small, the particle of physics and chemistry, about which our real knowledge seems only beginning in recent years. But modern science, starting again with astronomy, advanced at once to an entirely new position: it is here that it differs so significantly from the ancient. The new mechanics are dynamical and involve the reduction of problems of movement and growth to mathematical law. Ancient science, and, on the whole, ancient society, did not advance beyond the beginnings of statics, the first notions of balance in mechanics, and order in the state. Modern science begins with a law of motion and is crowned by the conception of an ordered progress in history.

We will begin our sketch, as the story began, with astronomy.

It was remarked in Roman times[1] that the establishment of astronomy by the Greeks had given a sense of order and security to the public mind, and allayed superstitious fears. This process had been going on for ages before the Greeks, above all in those millenniums of Egyptian and Babylonian history, when the priests began to record with some rough accuracy the regular positions of the brightest of the heavenly bodies. It was thus that the stars in their courses first gave man the idea of seeking for other uniformities in the complex and changing tangle of the world below. They were the first great instance which he observed of order in external nature beyond man's will, and they impressed the lesson on him

[1] See chapter iv, pp. 88 and 89.

in a hundred ways. They taught him on the plains of Chaldaea to measure time; they led Hipparchus to trigonometry and Ptolemy to geography. Now with the re-awakening of the Western mind they were to illustrate the reign of law and the scope of a co-ordinating intellect, on a scale transcending all the known limits of magnitude and distance.

Newton, the greatest name in this co-ordinating work, gained from his own rival Leibnitz the highest eulogy ever paid to a man of science. 'Taking mathematics,' said Leibnitz, 'from the beginning of the world to the times when Newton lived, what he had done was much the better half.' Even if we went as far as that, it would still be necessary, from the historical point of view, which is after all only the point of view of complete truth, to recognize the fact, that Newton, the greatest founder of mathematical mechanics, comes as the last of an inseparable series of observers and speculators, who all busied themselves mainly about the phenomena of the heavens. 'If I have seen further than other men,' said he, 'it is because I have been standing on the shoulders of giants.'

Copernicus, Tycho Brahé, Galileo, Kepler, Newton, not one of these names can be dissociated from the discovery of the greatest of all laws. Copernicus, starting, as he tells us, from an old Greek idea that the earth itself, like all the heavenly bodies, revolved round some central fire, set on foot one of the two most momentous scientific controversies which have ever raged. It lasted over a hundred years, and only disappeared at last before the accumulation of evidence, binding together terrestrial and celestial facts, which in the hands of Galileo, Kepler, and Newton showed irresistibly one

great system, acting, broadly speaking, as Copernicus had surmised, but on a far vaster scale and by virtue of a more universal principle than he had conceived. It is, indeed, the coincidence of these proofs, the fact that Kepler, by using the conic sections of the Greeks, was able to explain the revolution of the planets, and that Newton combined Galileo's law of falling bodies with the movement of the spheres, that will appeal to us most in making this study of the growth of human unity. It illustrates, as we shall see later, the essence of scientific method as a whole. The steps in the proof are of extraordinary interest, and show the natural co-operation of several independent minds, working consecutively to attain the one simplest and most consistent explanation of a vast number of hitherto uncorrelated facts.

Copernicus's hypothesis of a circle for the revolution of the planets was doubtless the first rough approximation which would occur to the mind: it had behind it the unbroken tradition of every system of representing the heavenly movements and was hallowed by the metaphysical notion that the circle was the 'most perfect' of all lines. Kepler, who came to the problem fortified by the exact discipline and rich stores of observation of Tycho, discarded the circle, with all its epicycles and eccentrics, and tried the ellipse. It was his first discovery and the first real simplification of the problem, which had been confused by artificial corrections of the original inaccuracy. It led almost immediately to his second law, that the straight line joining the planet to the sun sweeps out equal areas in any two equal intervals of time. In this second law he dealt with the variation in the rate of motion of the planet, and, finding it move faster

when near the sun and more slowly when away from it, brought us a long stage further towards the final solution which was to be reached by the joint labours of Galileo and Newton. The two laws, with a full history of his inquiry, were published by Kepler in 1609, just at the moment when Galileo was making his first observations with the newly-discovered telescope.

The telescope, like so many capital inventions, was hit on almost simultaneously by several minds: a spectacle-maker in Holland first made the discovery effective. Galileo was at the time professor of mathematics at Padua. It was nearly twenty years since he gave his crucial challenge to scholastic science at Pisa, and he had become in the meantime the leading teacher and man of science in Italy. With only a hint of the Dutch invention to help him, he set to work at once and made a telescope himself, magnifying to three diameters, and had soon improved it to the extent of thirty-three. Through this instrument he was the first inhabitant of our planet to see the mountains and 'seas' of the moon, the phases of Venus, the spots on the sun, and the satellites of Jupiter. The next year, 1610, he published his results to the world in the *Sidereus Nuntius*, and became the most famous man of science in Europe. Twenty-eight years later, old and blind and still under the ban of the Inquisition, he received in Florence a visit from the poet of English Puritanism, himself to fall on 'evil days and evil tongues', and sit for years in darkness.

If thought is a battlefield, Galileo had made one of its most decisive movements. It stirred the imagination and extended the outlook more than any other discovery, and it did not appeal to the lower or irrelevant passions

which the New Worlds of the navigators had aroused. These new worlds offered only intellectual conquests. The first victory was gained by a man, and in an age, capable of pressing it home and deriving full benefit from the success. Every point was shown to have a bearing on the Copernican controversy, and though Galileo professed, in his *Two Chief Systems of the World*, to offer an impartial statement of both sides, his own side was quite obvious, and the day was won. Later on, the same results, and others which the telescope continued henceforth to yield, gave material and confirmation at every turn to the mechanical generalization which Newton was to build up with the aid of the more abstract part of Galileo's scientific work.

Galileo, as the founder of modern mechanical science, added to the rudiments of statics which the ancients, principally Archimedes, had handed down, an entirely new idea of fundamental importance. This was the conception of acceleration, which arose in the first instance from his study of falling bodies at Pisa and later, under conditions which made fairly accurate measurement possible. From these experiments he gained the law of the uniform downward acceleration of bodies falling to the earth, of about thirty-two feet in the second added every second. Newton, with the genius which perceives true resemblances between remote and apparently disconnected facts, turned this conception of uniformly accelerated motion to the phenomena of the heavens. Are all the planets, he asked himself, falling towards the sun, and all the satellites, our own and those of Jupiter, towards their own planet, by the same law which Galileo

had discovered to govern the fall of the stone? This was the supreme effort of his imagination, the most fruitful instance in history of the unifying tendency of thought, seen more or less in all its aspects, but above all in mathematics, the 'art of giving the same name to different things'. Following where the question led him, he came to the other great conception, that of 'mass', which, with 'acceleration', completed the quite new elements in the modern mechanics then arising. The rest consisted in defining in accurate relations, the equations of which the Greeks had the first notion, the mutual influence of these 'masses' on each other, producing 'acceleration' according to measurable circumstances of space and time. Galileo's law for falling bodies was seen to be a special case relative to the earth: looked at from the celestial point of view, the same principle gave Newton the law, that the acceleration of all the planets towards their centre was inversely proportional to the square of their distances from it. 'They are all falling bodies, but going so fast and so far off that they fall quite round to the other side, and so go on for ever.'[1]

Kepler's laws were thus completed and explained. We noticed that his second law touched on the rate of motion of the revolving planets, which moved more quickly when nearer to their central, or focal body, in those elliptical orbits which he had just discovered. This was in 1609. Ten years later he had published his third law that there is a fixed relation between the cubes of the distances of the planets from the sun and the squares of the times of their revolutions. Approximately, that is, their velocities

[1] W. K. Clifford.

vary in the inverse ratio of the square roots of their distances. Both these laws were shown by Newton to be only deductions from, or varied expressions for the same relation which Galileo had detected in the falling stone. Both of them were essential to the growth of his mind on the subject. In 1665, his twenty-third year, he had a period of intense mental activity which lasted into the following year. He discovered at that time, as he tells us himself, among other important theories, 'first the binomial theorem, then the method of fluxions,' and then 'began to think of gravity extending to the orb of the moon, and having found out how to estimate the force with which a globe, revolving within a sphere, presses the surface of the sphere, from Kepler's rule (the third law) I deduced that the forces which keep the planets in their orb must be reciprocally as the squares of their distances from their centres: and thereby compared the force requisite to keep the moon in her orb with the force of gravity at the surface of the earth, and found them answer pretty nearly. All this was in the two plague years of 1665 and 1666, for in those days I was in the prime of my age for invention and minded Mathematicks and Philosophy more than at any time since.'

It is a curious commentary on the popular view of history, that, while any schoolboy could tell you that the two years Newton refers to were the dates of the Plague and the Fire, purely local accidents, not one person in ten thousand, children or adults, would connect them with two of the most profound and far-reaching events in the history of the world, the invention of the infinitesimal calculus and of the law of gravitation.

It was inevitable to treat of Newton in connexion with Galileo and Kepler, as their work in mechanics forms an inseparable whole, but in doing so we passed over for the moment the contribution of the man who was in some respects the central figure in the new scientific and philosophic movement of the century. In point of time, Descartes comes between the earlier group of scientists, Bacon, Galileo, Kepler, and many more, whose lives were largely spent in the sixteenth century, and the later group, Newton, Huyghens, Boyle, and the rest, who were entirely children of the seventeenth century. Descartes' life, begun just before the sixteenth century closed, filled almost exactly the first half of the seventeenth. He was considerably junior to Galileo, but lived as his contemporary for over forty years. He was studied with respect by Newton, who was born in the year of Galileo's death. In point of doctrine, too, Descartes takes a middle place; looking as far and boldly to the future as any in that age, he yet has many leanings and attachments to older systems. The great iconoclast of scholasticism, the immortal founder of a philosophy based on the simple fact of self-consciousness, he yet never appreciated the bearing of Galileo's work, nor admitted the motions of the earth, and in his own theories, both physical and physiological, was largely dominated by preconceived ideas, as remote from the facts as the 'perfect line' and the 'perfect number'. With this side, however, we have no concern here, nor with the validity of his metaphysics. He plays a part in our sketch, as having anticipated in so many ways the modern spirit, still more perhaps as having initiated one of the greatest improvements in

mathematical method. His artificial physics and physiology were due to the fact that his scientific interests outstripped his powers of verification. He meant his life to show that all knowledge could be brought within the scope of one incontrovertible method, and all knowledge was not quite ripe.

The one method was that of mathematics, which Descartes conceived could be reduced to a series of truths, so simple and self-evident that it was impossible for the mind to entertain the opposite. Starting from this point, he thought it would be found that all knowledge could be gradually brought into the same interdependent and invincible system, and he attempted in his own lifetime, the shortest of the great scientists of the age, to give examples from all branches. His interest in the ultimate utility of this well-founded and systematic knowledge, especially in the parts affecting human life and health, was equal to that of his great English predecessor, 'Verulam', to whom he several times refers in his letters. His superiority to Bacon lay in the fact of his much greater concentration. All his science—and he would apply the same rule to any one else desiring to attain a similar end—arose from the intensive cultivation of his own spirit, which was enlarged, as he tells us, by the unfolding of every new truth in surrounding nature. But the purpose of this training was not to be limited by individual advantage. 'We shall be able', he says, 'to find an art, by which, knowing the force and action of fire, water, air, stars, the heavens and all other objects, as clearly as we know the various trades of our artisans, we may be able to employ them in the same way

for their appropriate uses, and make ourselves the masters and possessors of nature. And this will not be solely for the pleasure of enjoying with ease and by ingenious devices all the good things of the world, but principally for the preservation and improvement of human health, which is both the foundation of all other goods and the means of strengthening and quickening the spirit itself.'

To follow out the points of contact between the self-evident method of Descartes and the scientific methods of later days would take us too far afield, nor is it strictly relevant to our purpose; but the reconciliation, which he was the first clearly to suggest, between the fullest individual culture and the pursuit of a social end, is the note which we shall need to keep in mind in all that follows. The three centuries since Descartes have brought more and more fully into prominence the social harmony between science and life which we hear only as an undertone in his work.

These general tendencies of a great thinker, invaluable as they are, must also necessarily be incalculable. No one can accurately estimate the influence of the conversations of Socrates or the dialogues of Plato. But we have in the case of Descartes a definite discovery in scientific method of the first importance, of which he describes the origin himself, from the practice of his own rules of simplifying every problem to the utmost, and co-ordinating all the common points of every subject. He dates the discovery exactly, as Newton does his, in the winter of 1619, when he was serving in the Austrian Imperial army at Neuburg on the Danube. It is a notable coincidence in personal

history that both Descartes and Newton were twenty-three years of age when their minds were most active and they made the greatest discoveries of their lives. The passage in the *Discourse on Method* is a classic in the history of thought. He had studied a little, he tells us, in his earlier youth, parts of three arts or sciences which he thought should help him in his newly formed design, of arriving by a true method at the knowledge of everything of which his mind was capable. These three subjects were logic, geometry, and algebra. But logic, as he had learnt it, seemed at best to be rather a means of explaining to others what one already knows than of extending one's knowledge. The geometry, or, as he calls it, the analysis of the ancients, suffered from being always restricted to the consideration of figures and not of lines, their simplest element; while the algebra of the moderns was confused and obscure by the particular rules and symbols in which it was expressed. What was needed was a method which would combine the advantages of all three without their defects, for it seemed obvious that in philosophy as in government, the fewer the rules the better. Analysing then still further the 'analysis' of the ancients into its simplest form, of lines rather than figures, he turned to algebra for the co-ordinating, synthetic part of his method. 'To hold these lines together, or to express several in one form, algebraical symbols were needed, the shortest possible: and thus I borrowed the best of geometrical analysis and of algebraical, and corrected the faults of one by the other.'

The step forward in the art of thinking was a long

one; it fully deserves to be commemorated side by side with Newton's great discoveries nearly half a century later in the years of the Plague and the Fire. In relation to one of them, Newton's method of fluxions, Descartes' discovery was as essential a part as Galileo's law of falling bodies was of the law of gravitation. For Descartes' analysis was in fact one stage in the continuous process of integrating and simplifying mathematics which was going on throughout the century. Napier of Merchiston had contributed logarithms in 1614 and with the discovery of the calculus Newton and Leibnitz forged an even more potent instrument of thought.

The *Geometry* of Descartes was first published as part of the *Discourse on Method*, of which it is the most brilliant illustration. It also illustrates in the aptest way that transformation of the persistent past which is the subject of our study. Descartes starts from the geometry of the Greeks. He has before him the summary of Pappus and the Conic Sections of Apollonius. He takes a linear problem of Pappus and shows how it can be more simply solved and stated by his new method. He quotes Apollonius, still the leading authority on the conics, and then, in the light of his own new application of algebra to geometry, arrives at the momentous discovery that while any straight line may, by the use of his two co-ordinates, be expressed as an equation of the first degree, the conic sections are the geometrical expression of equations of the second degree, the circle being but a special case of the ellipse. If the inward vision could affect us with as strong emotions as things we actually see, we should recognize here a wonder even greater than Galileo's

satellites of Jupiter and mountains on the moon. And the way of reaching the result is of capital importance. The great thinker uses the past, not only as all of us are bound to do, unconsciously, as the air we breathe, but deliberately, taking the old problems and the conclusions of his predecessors, thinking them out again in the fresh light of a later day, and gaining at last a new form, adapted to the growing unity and efficiency of the human mind.

It was an age of mathematicians. Others were working at kindred problems to that of Descartes, and he himself effected many other improvements, inferior to that of his great discovery, but comparable to those improvements in our arithmetical notation which we noticed as due to the Arabs and the Hindoos. Some apparently very obvious simplifications in the notation of algebra, due to Descartes, have probably been as effective in mathematical research as the Hindoo cipher has been in arithmetic. But the continuity of the main line of advance must retain our attention, especially as the next step brings us to the mathematical expression of that fundamental conception in modern science which distinguishes it from the science of the Greeks, the idea of movement and continuous growth. Compared with this, even Descartes' geometrical analysis, essential as it was, must take a subordinate place.

With the invention of the calculus in the seventeenth century we reach the last stage yet known to us in that art of measuring which brings the world into subjection to man, and of which we traced the first accurate beginnings in the early settled communities which built the

pyramids and gave us the week. In view of the new problems which modern science was now to solve, even the Greeks, with their immensely more penetrating and ingenious minds, must be classed rather with the pyramid-builders than with the modern physicist. The new factors in the problem of measurement which now emerged, were the intimately connected questions of infinitesimal quantities and continuous movement or growth. Of these we may say that the Greek mind had faced them only to be baffled and confused, while, before the Greeks, they had not been realized at all. Yet when once thought out, above all, when once expressed in convenient symbols, it is now found possible to give a real grasp of the potent instrument which has been elaborated for their measurement, to boys at school before the end of their sixteenth year. Descartes did not reach the solution, but he pointed the way, and when he criticized the Greeks for confining their geometry to figures, he put his finger on the cause of their failure to advance. The limited figure excludes the infinite, and the 'perfect' circle proved in more than one respect an impassable barrier to the free development of ideas of magnitude and direction. Archimedes, who in his method of exhaustions, made the nearest approach in the ancient world to an effective treatment of the problem involved, did so by gradually approximating the curved figure which he would measure to the nearest many-sided figures of which the correct measurements were known. When once Descartes had shown that any curved line could be expressed in equations of such generality that they were equally true for any points on the curve, the question

could be approached from quite another point of view. Thus, whereas Archimedes, and all, including Kepler, down to the age of Descartes, were endeavouring to find curved areas by approximating them to rectangular measurement—what was called in the old days the quadrature of the curve—the new method approached the problem from the side of the infinitesimal increment in the measurement of the curve as it moved from point to point.

This measurement, made possible by Descartes' method, was, like other great discoveries, led up to by a multitude of partial efforts, and actually made, independently and with different notations, by Newton and Leibnitz. Leibnitz' notation, following more closely the system of equations which Descartes had introduced, has survived for most purposes. Newton's, significantly enough, is still used for increments of time.

Descartes' analytical method consisted in the reference of every point in the line or curve studied, to an arbitrarily fixed point or origin, by means of two varying perpendicular lines or co-ordinates. Given the origin—and where we fix it does not matter, for every object observed must have an observer—we can by means of these co-ordinates follow the changes in position of any point whatever. Either of the co-ordinates, as they vary together, is said to be a function of the other, and their relation at any point is expressed in an equation with two variable quantities. In this, its simplest form, the idea has now become part of our common thought, and even children in the elementary schools are plotting their rule-of-three sums by Cartesian geometry. The

differential calculus starts here and goes further. Given a curve of which we can by its equation lay down any length or number of points that we desire, what is the law of its growth or falling off, that is, the direction of its movement at any point? To solve this problem with sufficient generality is to be able to describe in shorthand any regular movement, for an electric current, the motion of a train, the cooling of a molten mass can all be represented by a curve, as truly as the section of a cone. And the solution is found by a process exactly similar to that of determining what is the tangent or touching line to the curve at any point. Solutions of this, the particular case, were actually offered to Descartes by at least one contemporary mathematician: they were the preliminary, partial glimpses which have preceded every great advance. It was left for the wider synthetic minds of Newton and Leibnitz to take in the bearing of the question as a whole, when it was ripe for solution thirty years later. Then, when the differential question was solved, it was possible to return to the original problems of summing up series, or finding the areas enclosed by curves, which had first exercised the earlier mathematicians.

Thus another link was forged in the connected method of the physico-mathematical sciences which the Royal Society was founded to promote: and the last link was the strongest of all. For when the laws of physics and mechanics have reached this degree of generality, they are able to express on the physical side all changes in the world of matter from moment to moment, and subsequent laws can, as M. Poincaré says, take their places as fresh differential equations. The other inventions and

discoveries of the age, the barometer and the microscope, Mariotte's and Boyle's law of the pressure of gases, Huyghens' theory of wave-movement, Descartes' and Newton's work on the composition and refraction of light; even Harvey's circulation of the blood, must take rank after the physico-mathematical series which culminated in the calculus. It will be noticed, too, that the other scientific work of the age was mainly of a kindred nature, centring round the great discoveries in mechanics, those laws of movement which were its characteristic feature. Even Harvey's discovery was a mechanical one, and commended itself as such to Descartes before he would accept the true account of the movements of the earth. But it was in fact premature, for chemistry was not yet founded, and still less a knowledge of the chemical and other functions of living bodies.

As Harvey by his great discovery anticipated in 1628 the foundation of biology, which in its main outlines falls within the nineteenth century, so there were throughout other occasional anticipations of later advances in the more complex branches. Chemistry was not definitely founded as a science till the eighteenth century; but in 1674 John Mayow, another early member of the Royal Society, alighted, by some ingenious experiments with candles and small animals, on the existence and fundamental property of oxygen, a century before the fact could find its place in a co-ordinated system.

Such instances bespeak the intimate similarity of all scientific truth; and their isolated position brings out still more clearly the general trend of seventeenth-century science. It was, as that early meeting in 1660 declared

it, a physico-mathematical movement, and as such it ran its course before the more complex sciences of life took definite form. It has grown continuously ever since, and by its connexion with industry and the practical arts has become the most powerful and typical branch of science as the agent in subduing the forces of nature to the use of man. Before the end of Newton's life, who is the culminating figure in the movement, it had done its great preliminary work. It had given men a new and incomparable instrument of research, and had established in their minds a new and consistent view of the mechanics of the universe. Newton, one of the longest-lived philosophers of his day, as Descartes was one of the shortest, did not die till 1727, the year before the birth of Black, who was to give substantial help on the scientific side to Watt in the construction of his steam-engine. His life thus brings the modern scientific movement to the point where it touches the industrial revolution which is its counterpart on the practical side.

We have sometimes measured in previous chapters the real advancement of an epoch by the comparison of an earlier and a later figure on the same line of progress, Thales and Hipparchus for the Greeks, the author of the Twelve Tables and Gaius for the Romans, the flint-axe and the steam-engine for the practical arts. The publication in 1687 of Newton's *Principia*, the Magnum Opus of seventeenth-century science, suggests a similar comparison, more impressive perhaps than any other. It was essentially the same human mind which had once counted fingers and matched pebbles in the primaeval cave, and was now reaching to the stars, measuring the

speed of light and reading its own riddles in the unfathomed depths of space. On the one hand the savage, struggling to five as the limit of his number; on the other, the astronomer studying the double stars, so distant from us that our whole solar system, if seen from them at all, would be but a speck, and finding in their motion fresh illustration of the conic curves of which Apollonius, Descartes, and Newton had expressed the law: and between the two men there is real identity as well as progress.

This journey, from the furthest bourne of human thought to the threshold of triumphant science, might, had we full knowledge, be mapped out completely in similar consecutive steps, sometimes quicker, sometimes halting, with stretches without apparent movement, but all of kindred nature and tending to the same goal. We have in previous pages had some glimpses of the more critical passages on the way, and noticed points in the movement specially germane to our general theme. This growth of science is by no means the whole of civilization, but it holds a commanding position in it, and several features in the scientific evolution seem identical with the conquering social spirit itself. Like language, the method of exact science has a double aspect, the external facts which it brings together and arranges, and the human minds of which it correlates and expresses the thought. Now on each side of this double process the unifying action of scientific thought is its most striking feature. On the objective side it carries the generalizing process of language much further and applies it exactly. Where language gives the

same name to like things, science, seeing deeper, can give it to the superficially unlike, and express by the same equation the fall of the stone and the revolution of the planet. The first century of modern science has furnished us with abundant instances, and the same tendency persists throughout. It is the logical essence of the process, though we are here rather concerned with the social aspect of the fact. Just as the method consists objectively in collecting resemblances from the complex of phenomena and expressing them in the simplest exact general statements or laws, so, on the side of the human minds perceiving the resemblances and formulating the statement, there is a corresponding process of comparison and unification. The differential equation, though Leibnitz suggested its precise form, sums up the consensus of innumerable minds, the earliest savages who noticed the likenesses of things around them, the first measurers who agreed to lay out their fields and decorate their buildings on a common scale, the Greeks who formulated the similarities of figures in the first equations, the Arabs who improved the notation, the thinkers of the seventeenth century whose genius, co-operating, through many minds, carried the idea of a common law into the recesses of space, and expressed it so concisely that it has become the universal and permanent intellectual currency of mankind.

Scientific method, of which these mathematical expressions are the most perfect type, was not yet able to knit up the globe, for minds sufficiently advanced were still few and confined to a small area ; nor was it yet in touch with the practical powers which were to effect the indus-

trial and social revolution of later years; but it was firmly established as the natural and fundamental link of progressive human society.

Its history and its use both proclaim the necessary unity of human effort. For science arose from the simplest facts of common experience, and grew by the co-operation of the mass of men with human intellect at its highest. And when developed it returns again to widen and strengthen the common intelligence and increase the common good. Above all, more perfectly than any other form of thought, it embodies the union of past and present in a conscious and active force.

9

THE INDUSTRIAL REVOLUTION

A century has elapsed since the invention of the steam-engine and we are only just beginning to feel the depths of the shock it gave us. But the revolution it has effected in industry has nevertheless upset human relations altogether. New ideas are arising, new feelings are on the way to flower. In thousands of years, when, seen from the distance, only broad lines of the present age will still be visible, our wars and our revolutions will count for little, but the steam-engine, and the procession of inventions that accompanied it, will perhaps be spoken of as we speak of the bronze or chipped stone of pre-historic times: it will serve to define an age. If we could rid ourselves of all pride, if, to define our species, we kept strictly to what the historic and pre-historic periods show us to be the constant characteristics of man and of intelligence, we should perhaps not say Homo Sapiens, but Homo Faber. BERGSON.

Soon after the death of Newton, after the completion of the first essay of modern science, man's new intellectual instrument came in touch with his old practical, tool-making and tool-using, instinct, which M. Bergson rightly treats as a constant and progressive characteristic. These two sides of his activity had been in necessary relation from the first, but the seventeenth century had seen an exceptional outburst of the abstract, generalizing spirit. The purely intellectual instrument had now far outstripped in fineness and power the concrete tools with which man alters and fashions the world around him. The eighteenth century was to witness such a sharpening and strengthening of tools as the world had never seen before. It was the historic meeting-place of Homo Sapiens and Homo Faber, a capital step in the onward march of mankind towards the conquest of nature. Scientific intellect was now wedded to practical skill, the old skill of the smith in engineering, of the weaver in manufacturing, of the farmer in agriculture: and the face of the world, almost everything we see and use, has been changed as the result. But the meeting of Homo Sapiens and Homo Faber was not only that of scientific intellect and practical skill in the abstract. The small band of thinkers and inventors came in touch with the mass of the workers who were to be organized by the new system, the new methods of production necessitated by elaborate and intellectualized machinery. This is the social side of the historic meeting-point, and ultimately the most important: for it leads to the socializing of

science which is involved in popular education, and the socializing of the products of the improved machinery by social reform, which became the increasingly predominant interest of the succeeding century. Of these large and more remote consequences we shall only touch the first fringe in this chapter, and shall leave the unfinished edges in our last. The revolution was, like all other events, the natural sequel of what had gone before, but it was distinguished by its greatly accelerated rate of movement, and by the profound changes in society as a whole which it effected.

The changes in the Western world from the latter part of the eighteenth century onwards are essentially a part of the same movement which began in the thirteenth century, was quickened by the revival of learning, and brought to a height by the meeting of the Man of Science with the Man of Tools. It was the speed of the changes in the later years which made them revolutionary. And there is also a material difference in the later years in point of depth. The revival of learning was an aristocratic thing. A few fine people cultivated the arts and re-discovered the ancient leaven which was to leaven the lump. But the condition of the mass was little altered, and where altered not always improved, from the thirteenth century till after the industrial revolution. Nor was the scientific movement a popular one. It was developed by a small number of distinguished persons, and patronized by kings and princes, who sometimes, like Charles the Second, themselves played with the new toys. It led to the efforts of the enlightened and reforming monarchs of the eighteenth

century, but it did not affect the whole of society, until the sweeping changes in the life of the people, which resulted from the union of science and industry, brought men together in masses and made all men think.

We noticed in the last chapter the sequence of dates which connects the life of Newton with Watt's steam-engine, the decisive event in the industrial revolution. Black, whose discoveries in latent heat helped Watt to the invention of his condenser, was born in the year after Newton's death, and made his discoveries about 1760 when he was just over thirty. Besides these discoveries in the latent heat of steam which were of immediate practical application, he became one of the founders of scientific chemistry by establishing the fact, which Mayow had surmised nearly a hundred years before, that bodies lose by combustion a measurable quantity of some substance which he called ' fixed air '. Black's work has thus a double or treble interest, as a connecting link between science and industry, and a foundation stone of modern chemistry by extending measurement to another order of physical facts. Watt himself was a man of thorough scientific training, based on mathematics, and kept in touch with all the leading thought of the day.

The links are significant, but we must beware of pressing them too far. The mechanical inventions which revolutionized industry, followed the establishment of modern science, and were increasingly aided by it, but we cannot pass directly from one to the other, as from cause to effect. Man's inventive and practical powers develop constantly and spontaneously with the suitable stimulus of opportunity. Inventions were being made

in the 'dark ages', and by unscientific people like the Chinese. The most potent of all educational inventions, the printing-press, was quite independent of abstract science, and, side by side with the scientific evolution of the seventeenth century, a series of inventors, such as Denis Papin and the Marquis of Worcester, were making ingenious sketches, which often anticipated the successful inventions of a hundred years later. The genius of the mechanical inventor is rather of the practical and organizing kind, 'conceiving and arranging in space the various mechanisms which are to produce a given effect, controlling, distributing, and directing motive forces'.[1] The historic meeting-point of the eighteenth century is really another example of that integration of human powers of which science by itself offered so many striking instances. Just as mathematics, mechanics, and physics all gained immeasurably by mutual aid, by discovering their identities and points of contact, so, in the distinct but related spheres of theory and practice, the eighteenth century established a closer relationship of the most fruitful kind. In the steam-engine there was the first contact of developed science and industrial practice of an immediately and abundantly productive kind, and ever since the union of powers has been more and more deliberately pursued.

Converging on the same point, the invention of a practicable steam-engine just after the middle of the eighteenth century, came a series of improvements affecting the smith's art itself, the typical craft of Homo Faber. The manufacture of steel and iron was being revolution-

[1] Condorcet.

ized by the application of coal to smelting, and by a series of improvements in the process. By 1761, when Watt and Black were in consultation, the blast-furnace had made possible the large and cheap supply of iron without which the steam-engine would have been abortive.

Here, then, begins the real age of Iron, not a degradation, as poets had fabled, but a stage in advance, difficult indeed and crossed by terrible evils, but based on some of the most solid and helpful facts in our environment. Man awoke to find that he had beneath him in his 'iron-cored' globe the greatest wealth in the commonest metal. And it was a wealth unlike that which had given the metals their order of worth. That was the value of scarcity, this the value of use. The commonest and in appearance the least attractive of metals was to perform prodigies of strength. The finest cutting, the heaviest hammering, were alike its work. It was to build the highest structures and the largest ships, to link up continents and pierce the earth.

This decade, between the Seven Years' War which gave us Canada and India, and the war with the United States which gave the New World independence, was full of consequences for mankind, and in the first place for England. It was a decade of invention. In 1765 Watt produced his first practicable steam-engine, with the separate condenser. It was still only rectilinear in action and used for pumping. Almost simultaneously the primitive processes of spinning and weaving were being transformed by the inventions of Hargreaves and Arkwright, Crompton and Cartwright. Arkwright was the main agent in producing mechanical spinning, as Cartwright

later was the principal inventor of the power-loom to work up the vast quantities of yarn produced. Arkwright's first mill for spinning cotton was set up in 1769, and was worked at first by horses and then by water-power. This water-worked mill survived in many cases the introduction of steam, and its remains are a familiar object in many a Lancashire and Yorkshire valley. By 1775 Arkwright's inventions were complete and ready for the matured work of the greatest of the inventors. Watt's engine still needed to be adapted to the regular circular movement required in a mill. In the following ten years the difficulties were overcome, and the first cotton-mill, worked by steam, was started in Nottingham in 1785. Nottingham and Derbyshire were chosen as the scenes of the first mill experiments, to avoid the opposition of the handworkers in the north who saw their livelihood threatened by the new machinery. The first steam-propelled cotton-spinning mill in Manchester dates from the year of the opening of the Revolution in France, four years later.

It is one of the memorable coincidences in history.

In the procession of mechanical inventions which followed the mere concrete facts are stupendous. It is said that the steam-engine alone has added to human power the equivalent of a thousand million men. This clearly is but a fraction of the mechanical advantage, the brute force, which man has gained in little more than a century since the steam-engine began. For we must add to it the whole of the electrical energy now employed, the extension of water-power by hydraulic and other means, and, within the most recent times, the

power generated by oil-engines, which alone has been stated to be equal to two million additional human hands. Suppose that by these and other mechanical means man can actually multiply many times his motive strength and freely organize and direct the result. This is not far beyond the present problem, and it has been reached on the lines which Bacon and Descartes advocated three hundred years ago, of studying the ways of nature so as to command by obeying her. But it may be doubted whether, if one of the ardent pioneers of the seventeenth century could awake and see the use that mankind has made of its vast added powers, he would be satisfied with the result. One of the wisest men[1] of the last generation left unpublished among his papers an essay in which he raised the question, 'whether the steam-engine was not invented too soon', and was inclined to answer in the affirmative. It is a question in hypothetical history, but it puts in an arresting way the problem of the immense new resources of the last hundred years, compared with the wisdom and public spirit shown in their use. Most of us will sadly conclude that probably no wisdom would have been learnt before the material was at hand to be wasted in the learning.

The moment of the invention was marked out by the concurrence of several lines of events. Better pumping-engines for use in the mines were more and more needed, as the demand for coal increased. Steel and iron had been cheapened. Science had just become able to give the necessary help to guide the inventor: and the simultaneous inventions in the textile trade

[1] Dr. J. H. Bridges.

offered the widest possible field for the immediate use of the improved engine in other work. The coincidence with the beginning of the French Revolution is a curious accident, which deserves to be set side by side with the fact that the fundamental discovery of the identity of lightning with electricity was made shortly before by the same man, Benjamin Franklin, who in 1778 induced the French to form the alliance against England which secured the success of the United States in their war for independence. In a wider sense none of the coincidences was accidental, for all the events sprang from the same exuberant spirit of mental freedom and confident activity which followed the creation of modern science, and marked especially the years which ushered in the Revolution.

In the stage which we are now discussing, England indisputably took the lead of the world. In the rise of the new science and philosophy of the seventeenth century, France and England worked side by side, and one of the greatest of all the builders, Leibnitz, was a German ; but in the industrial development England was easily chief. Many causes contributed to this ; the geographical and physical deserve perhaps the first place. Just as we saw in the ancient world the influence, first, of the great eastern river-valleys, and then of the Mediterranean and its encircling lands, so now, after the discovery of the New World and the rise of a new science and a new commerce, a fresh centre of human intercourse began to grow around the shores of the Atlantic. In this new grouping England and France hold a favoured place, and especially England. Set in

her own seas, clear of her neighbours on the continent but within easy reach of them, England stretches out her hands to the West. In years of life-and-death conflict she had trained her sons to a more perfect mastery of the seas than any other people, and founded the greatest settlements of white men in western and southern seas. When the full streams of modern commerce began to flow, they passed mainly through her ports. Within she was as well equipped by nature for the coming development as she was by position and training for external commerce. She had large stores of coal and iron, the sinews of the new war, conveniently placed. Her climate in the north was peculiarly well fitted for the textile work, and her population had for generations been engaged by more primitive methods in the manufactures which were to be expanded by the methods of science. The greatest of the practical steps in industrial invention were first taken by Englishmen, by Watt in the steam-engine, by Arkwright and his fellows in textile machinery, by George Stephenson in the locomotive. And England reaped the main harvest, in wealth, in population, in territory and international influence. Slowly, as we shall see later on, other countries have followed England in this industrial expansion, till she has lately been in some points overtaken ; but not before the effects of the first transformation, at the turn of the centuries, have been impressed for all time on every part of the history of the world.

The textile trades offered the first and most fruitful experiments in machine production. Of the two main branches cotton was first affected, which was produced for the inexhaustible market of India and the East. The woollen manufacture was transformed later, and has never

reached the same pitch of organization. It was the oldest and most indigenous of the textile trades, and could trace its origin to more necessities and circumstances in the life and history of the country than any other. The wool of England had been in old days a great source of wealth, and her main export. Wars with France had been waged in the Middle Ages on the proceeds of an export duty on wool, as the revolutionary war was soon to be decided by the wealth produced by the new textile manufactures. But for many years the wool, which had once been exported, had been spun and woven in the cottages of West Riding farmers and others, who would themselves complete all the processes and go to market with the product. It is little more than a hundred years since the small grass-farmers near Leeds might have been seen there twice a week in the main street just above the bridge, selling the rolls of cloth which they had themselves bought as wool, worked up with their own wives and daughters at home, and brought to market on their own horses. The picture is a typical one and illustrates many aspects of the industrial revolution.

Before the revolution, the family had been the unit and the home was the workshop. Labour was little divided up or specialized, and it was carried on in the midst of the life and operations of the country. After, the capitalist's business became the unit and the factory was the workshop. Labour became more and more specialized, each separate process becoming the work of a separate class of workmen, and new classes of men were called for, to organize the whole and do the buying and selling. Lastly, the economy of the large factory,

and the convenience of having kindred industries in close proximity, created the large towns and brought the multitudes of workers together. This, from the social point of view, was the most important part of the change : since the end of the eighteenth century more than half the population of the leading countries of the world has become urban. One instance will suffice. Lancashire, the home of the greatest of the highly organized industries, advanced from a population of 166,000 in 1760 to nearly 4,500,000 in 1901, not far short of the whole population of England two hundred years before.

The growth of the large town and the part which it was to play in the later development of society, are points of the first importance, and recall our minds to what had been taking place on the country-side during the years of critical change in manufacturing methods. Here, too, the methods of science and the desire of improvement had been active since the beginning of the seventeenth century. The brave and indefatigable Dutch, most stimulating to western Europe of all the smaller nationalities, had been the pioneers of improved gardening and farming. In the sixteenth century they had shown the world how to fight for freedom : in the seventeenth they had invented the telescope, produced Grotius and Spinoza, and given a home to Descartes. On the practical side of life they were as effective as in intellectual matters. Modern banking and finance, strong social and international bonds in later times, were largely of their devising : and in the middle of the seventeenth century their example began that transformation of English agriculture, which, by the time of the industrial revolution,

had produced crops and animals three or fourfold finer than they had been a hundred years before. Better manuring and more constant use of the land, the introduction of root crops and artificial grasses were some of the principal means employed. Wealth was increasing as rapidly among the land-owning class as it was soon to do among the manufacturers. In the general passion for productive improvement the policy of enclosures found its strongest support. For two hundred years landlords had been adding, where they could, pieces of waste and common to their estates: in the eighteenth century the process was carried on under Acts of Parliament, much more extensively and deliberately. The purpose was improved production; the incidental result widespread suffering and the depopulation of the countryside.

We are concerned here with the matter only so far as it bears on that growth of the town population which is an essential element in the closer organization of society which followed.

The better tillage of the soil was not to prove the rallying point of human industry, hope though we may for a time when our great societies, organized and strengthened by the discipline of the 'great industries', will return to the natural home of primitive men and all children, made still more fertile and knit together by the resources of science. The earliest achievements in improved cultivation assuredly made no direct advance towards this goal. The dispossessed and impoverished cottagers and commoners made their way, some to the New World, still more to the growing towns, where the factories were ready to swallow men, women, and children,

and cared little for the technical skill, either of the old craftsmen or the farm hand. The country was no place for the organization of labour. It bred quietness, a leisurely routine, the acceptance of the orders of men and nature without active complaint or feverish anxiety to have them altered. That it does this bespeaks it a natural home for men, for these things are of the spirit of home. But for the work in hand in the world—the assimilation of the vast resources which the new science and mechanical inventions had put in man's command, and the organization of a society strong, keen, and united enough to grasp and utilize them—quick exchange of ideas, vigorous combination of many minds and many wills were needed. This is the gift of the town.

The gift must be studied with discernment and the eye of faith. For round the newly forming cities, centres of so much vital activity for the future, the want of wisdom, the pre-occupation, the carelessness, the greed, of the time allowed a cloud of misery and hideousness to gather thicker than the smoke which enveloped the working of its mechanical powers. It was a moment of grave external crisis, added to the working of the greatest experiment in home industry. How intimately the two were bound together, we shall see in the next chapter: with what better issue we should have met the internal revolution without the external distraction we can never know. The main facts are beyond dispute. During the revolutionary war, which followed closely on the general installation of the steam-engine, and for more than a decade afterwards, the condition of the mass of the people of England was probably worse than it had been at any

previous period, while landlords, manufacturers, and capitalists generally, were making larger profits than ever. But if on one side of the account there is inhuman wealth, the hovel and the game-laws in the country, and the factory child in the town, on the other there is the stern determination, the hundreds of millions of pounds, the unnumbered lives of the war with France.

Our thread of science organizing industry, the stage which the eighteenth century marks in the progress of a collective human force in the world, will be found to give some guidance through these amazing contrasts. It led to the aggregation of workers in towns and large centres. But the first aggregation took place in such haste, with such strong inducements to amass wealth and with so little knowledge of the laws of health or economics, that evils of all kinds were allowed to flourish, which will tax severely the more fully developed science and the more even-handed policy of our own day to eradicate. It is outside our scope here to attempt any sketch of the social conditions of the time, and the accumulation of such details would obscure the one point which it belongs to our argument to make clear. But two or three steps have so direct a bearing on the organization which was to follow, that they must be mentioned.

Largely through the enclosures, poverty in the country had increased, and the real wages of the labourers were seriously reduced by bad harvests and the rise in the price of corn. At last, in 1795, in face of widespread destitution, a pretty general decision was come to by the magistrates of the country to supplement the inadequate wages by allowances from the rates. This had the obvious

result of keeping down and further depressing wages: while, as additional allowances were made for additional children, a stimulus was given to the production of children to live on the starvation wages provided. It is the classical instance of ill-judged benevolence attempting to remedy the evil consequences of ill-regulated and precipitate money-making.

The town, attracting labour from the impoverished country-side, paid it on the average but little more than the country rates, while the gangs of children, imported for factory work from the guardians of the poor, received nothing but their miserable keep. In such a state, with war and the corn-laws keeping food at famine prices, it is hard indeed to detect the germ of social hope which the factory system had within it. It was not till 1824 that, with the abrogation of the conspiracy laws which forbade combinations of workmen, the natural ameliorative tendencies of the system began to have some play. The workers from that time onwards began to unite openly to improve their lot, and the first and, from the social point of view, the worst period of factory history came to an end.

By this time a new principle of political action had in fact gained the ascendant, the doctrine of *laissez-faire*, of which Adam Smith was the greatest prophet. His book on the *Wealth of Nations* had appeared in 1776, with influence in far more directions than we can even glance at. The doctrine is a part of the general spirit of freedom which was to blow to so fierce a storm in France. In England it was the instrument for removing many of the old restrictions on work and wages, which

could have no place in the new system of large industries and mobile labour. In the first reaction against the old regulations, men were apt to think that it was only necessary to remove every check and let natural forces, the free competition of workmen and capital, settle all difficulties. Later experience has shown the narrow limits of this doctrine, but there were then serious and indefensible obstacles, only waiting for the first vigorous attack. There was the law of settlements, by which labourers were chargeable to the poor-law only in the parish where they had a 'settlement'; there was the regulation of wages by the justices at quarter sessions, the law of apprenticeship, and the law preventing combinations of workmen. All these had to be swept away, and the doctrine of freedom found here an application in England, while in France it was destroying more exalted and imposing institutions.

With the removal of these restrictions, especially that on combination, the organization of labour, which naturally followed the aggregation of workmen in large trades and in large centres of population, could proceed. The century which follows, marvellous for so many things, might indeed be called, among other names, the century of organization. Of many causes, the factory and the resulting town, with its large increase in the general population, are among the chief.

Adam Smith, in his great book published before the steam-engine had given its prodigious impulse in the same direction, points out the importance of the division of labour in cheap and efficient production. It is far truer of factory than of agricultural labour, and every step

in the development of machinery has intensified the process for good and evil. It is fundamental to modern industrial organization, so characteristic of it that all previous labour seems by comparison as simple a thing as the Leeds farmer-weaver selling his own cloth on the bridge. In every branch of manufacture, every detail, the eyelet, the edging, the turn of the screw, has become the province of a special order of workpeople, manipulating a special machine, often forming a special organization to defend their own interests. From one point of view, narrowing, mechanical, monotonous; from another, an impressive lesson in the dependence of every particle in the social organism on every other and on the whole. To the countryman, to the workman in a simpler state, the fact, equally true, is more remote; the factory worker is surrounded by his fellows and depends at every step on what others send him.

With the growing specialization went a growing need for special means to keep the whole together. This was equally true of the workmen, the article produced, and the market in which it was to be sold. Each sphere called forth new and special organizing skill. The trade unions, bringing together the workers and defending their interests, have been the principal agents in developing this faculty among them. They are, broadly speaking, the outcome of the factory system and well represent it, both in its specialized branches and its larger combinations. Often, too, in the century which succeeds its emancipation, labour is seen striving to attain, like science, an international unity.

Other forms of organizing skill, arising from the new

order, became prominent at an earlier date. Trade, town, and government all afford abundant illustration. Each trade in these conditions requires for its success the perfect co-operation of all its parts, just as the complicated engine does, which provides the motive power. This co-operation, which we take for granted in any running concern or running engine, is really the expression in concrete fact of a vast force of organizing mind, which has itself grown up with the system, making and being made by it together. Nor does it reside exclusively in any one set of minds, though there must be special organizers, such as foremen and directors. Every person taking part in such a system has in some degree his spirit of co-operation heightened. The town even more than the trade encourages this tendency. It is a commonplace of our contemporary life, as common as the air we have always breathed and of which till the eighteenth century, not yet two hundred years ago, mankind was entirely ignorant, both as to its nature and its operation.

For the business relations, which gave rise to the town, become but a small part of all the forms of association by which its members are developed in co-operative activity: and it grows by its own growth. It is Aristotle's city-state, writ large, in letters of steel. The necessities of machine production made the modern town: its organization offers to the citizens a larger and fuller life. Iron for marble, smith's work for sculptor's and mason's—much of the difference between the modern state and its archetype is expressed in that change—both as a fact and as a symbol. Less beauty, less individual work, less freshness of thought mark the modern structure: but its material

is more durable, the lines of the building are larger, and the ties and stresses are arranged in the light of a higher mechanical science.

The whole framework of government was in fact soon affected by the new organization of industry. The full effects were not reached till later years when the great movement for freedom and humanity, which is the subject of the next chapter, had entered into men's minds. But from the very beginning of the nineteenth century, in the darkest period of factory life, there were signs that the state would not be content to rest in the doctrine of negative freedom, of non-intervention, with which it first met the industrial changes. In 1802, prompted by a memorial from a group of Manchester reformers, Sir Robert Peel, himself a wealthy manufacturer, passed an Act imposing some slight obligations in matters of health, hours of work and instruction, on the mill-owners, in the interests of the children employed, and introducing inspection. It was the beginning of the elaborate network of factory legislation, in which England, the pioneer in factory invention, has again led the world in mitigating the results. This is one branch of the multifarious state-activity which has grown in succeeding years with accelerating speed. It has already increased so much that, though the groundplan of our law remains as it has been laid down for centuries, by far the greater part of our statutes and administrative machinery is subsequent to the industrial revolution. It has grown with it, like our system of national communications, which is another outward sign of the working of the organizing mind, so powerfully stimulated by the events of the period. Good highroads

with stage-coaches, posts, canals, railways, and telegraphs —the nervous system of our present society—all is less than two hundred years old, and most of it directly connected with the mechanical discoveries.

Now it will be noticed that this organizing activity is by no means identical with state action, although the state has shared largely in the general stimulation. Voluntary forms of co-operation, the organization of independent enterprise, have been at least as active; and the freely formed links are some of the strongest. This outburst of organizing and unifying activity in society which followed the industrial revolution is clearly one of the great stages in the growth of a collective human force in the world, and intimately related to the organizing skill implied in the machines themselves. We may, as Helmholtz in his famous study of the formation of the eye, find faults still more serious in the social process. Yet, as it develops, we seem bound to recognize in this organization of industry by science an indispensable instrument for furthering the unity and efficiency of the race: and, more happily than in the case of physical defects, we have it largely in our own power to effect a cure.

But the retrospect of the two evolutions, of science in the seventeenth and industry in the eighteenth century, must leave very different feelings in the mind. There is no cloud on the fame of Galileo or Descartes or Newton, but we cannot think of Watt or Arkwright or Stephenson without a vision of the loss of life and beauty and happiness which has marked every step in their achievement and reduced the sum of the benefits which they have

conferred. The former find their goal in a closer and more comprehensive unity of thought ; and both their motive and their reward are immediate and pure. The work of the latter struggles to success through all the obstacles of material difficulties and imperfect human wisdom and wills. The rewards are mixed and ill-divided, like the capacities of those through whom they must be reached.

And while the apprehension of a great law is given in a moment of the individual's life who sees it, the realization of great social changes must be measured by another scale. A generation is a moment when all society is to be changed. It is just a hundred years since the first steamer left the Clyde and much less since the first locomotive engine took persons still alive on a journey by rail. The interval since is so crowded with events that we rightly treat it as an epoch : yet in the life of the species it is but an instant—a flash from the anvil in the forge of mankind.

10

THE REVOLUTION, SOCIAL AND POLITICAL

The destination of the human species as a whole is towards continued progress. We accomplish it by fixing our eyes on the goal, which, though a pure ideal, is of the highest value in practice, for it gives a direction to our efforts, conformable to the intentions of Providence.

KANT, *Criticism of Herder*, 1785.

We isolated in the last chapter one aspect of the great European movement which links the eighteenth and nineteenth centuries together. It is the aspect in which our own country was most prominent, which has made most apparent difference in the face of the world and seems most directly to bear on our main topic, the growth of the collective force of mankind, conquering and utilizing the forces of nature. But throughout our sketch, throughout the rise both of modern science and modern industry, the need constantly emerged of wider and more human ideas to give purpose and motive power to the movement as a whole. One can imagine a supremely skilful industrial state, based on science and organized by master minds, in which the whole purpose was the pleasure and aggrandizement of the few, and there was no thought of the community and common ends of man. Such we know the modern system has often appeared to its more hostile critics. It would be a ship constructed and equipped with perfect art, but wanting the guiding mind to take it on its appointed journey, or, at best, making a pleasure-trip for the amusement of the upper-deck; and all the omens tell us that the voyage would be short.

The picture has value as a warning. But it would be untrue even of the industrial revolution as we have sketched it in England, and it entirely ignores the wider and deeper ideas of human duty and destiny which were gaining ground at the same time in the Western world. We must now enter on the larger field to complete our

view, and in doing so return to that co-operative action of the leading nations, especially of France, Germany, and England, which we noted as the issue of the Middle Ages.

While England was accumulating the wealth which was to give her and her system the preponderance in the conflict with revolutionary France, the lead in abstract thinking, which she had held in the seventeenth century, passed for the time to the Continent, and primarily to France. It was France, and above all Lavoisier, who first co-ordinated the results of the new discoveries in chemistry and constituted it a science. It was France that a little later laid the foundations of biology by the labours of many great men, especially of Bichat and Lamarck. They were French thinkers who proclaimed most clearly the new principles of human progress and unity. It was France who made those principles her national gospel and staked her existence on teaching them to the rest of mankind. Hence it followed that the attempt to realize those principles immediately in practice became identified with France, as the industrial revolution was identified with England, though in the former case it is easy to show that the movement was really international and to cull similar thoughts from all the nations of the West. Only the soil of France was better prepared and her temper more fervid.

One might go back to the Stoical philosophy which closed the Greco-Roman period, and find in that the 'principles of the French Revolution'. Then, after ages of local patriotism and tribal mythology, men had begun to feel the reality of a larger whole, the 'Inhabited

World', where slave and emperor were naturally equal and naturally bound to follow an equal law. Christianity had built its first simple structure round the same corner-stone, and the long discipline of the Catholic Church had brought permanently together a large civilized nucleus in the West. Then came the vast sense of power, the illimitable vistas of possible improvement which entered into the world with the discoveries of science. The spirit generated by the whole process in leading minds of western Europe may be traced in many statesmen and writers of the mid-eighteenth century, collectively and conspicuously in the French group of 'philosophes' who circled round the Encyclopaedia, and most of all in the purest and noblest victim of the Revolution, the Marquis of Condorcet. He will best exemplify the new spirit in its full strength and with its accidental and superficial defects. There are three aspects of his social and historical doctrine, as expounded in the *Sketch of Human Progress*, which specially concern us. It is in the first place a universal doctrine, herein like that of the Stoics. Mankind is to be united, and 'wars will be regarded as assassinations'. In the second place all men are to be equal, at least in their opportunity for happiness and improvement. Slavery is to be abolished, and all the chains in which, like Rousseau, he saw men fettered, are to be struck off. Herein the new doctrine, starting from the same root-idea as the Stoics, is prepared to give it a more immediate and practical application. And lastly—the most characteristically modern element—he taught that man individually, and society as a whole, is capable of indefinite improvement. 'Nature has set

no limit to our hopes', and the 'picture of the human race, freed from its chains, and marching with a firm tread on the road of truth and virtue and happiness, offers to the philosopher a spectacle which consoles him for the errors, the crimes, the injustice, which still pollute and afflict the earth'.

Condorcet and his burning hopes, written in 1793 when he was *hors la loi* and hiding from his enemies in the Convention, may well have the first place among our witnesses to the new gospel. Though proscribed and done to death, he was the spokesman of the most typical and moving thoughts of his nation at the moment when it was waving the banner of a new life and a new humanity in the face of the world. But we may find the same ideas, more deeply grounded in a general philosophy and expressed with a more comprehensive wisdom, in the greatest contemporary thinker of Germany. Kant, too, was largely influenced on the social and political side by Rousseau, but he was free from the animus against the past, and especially the religious past, which perverted so much of the work of the 'philosophes'. In 1784, ten years before Condorcet's *Sketch*, five years before the outbreak of the Revolution, he published his *Ideas towards a Universal History from a cosmopolitan point of view*. This is incomparably the most powerful and pregnant statement of the views which we are discussing, before the nineteenth century made them a commonplace. Kant begins by showing how we can reconcile the freedom of the individual will with the evolution of society according to an ascertainable law. The solution is to be found in the necessary dualism of the process. Man must

develop as an individual, yet the individual only realizes his full powers in a constantly developing society. It is by regarding social movements in the mass that we become conscious of their conforming to definite laws. Of these laws the most important and comprehensive is that of the growing cohesion of men in societies which secure the justice and stability needed for individual and social progress. The capital and most difficult step has been already achieved in the foundation of well-ordered political communities: this must give us confidence that some day the natural issue will result, and a world-community arise in which wars will disappear, as private war has disappeared in the separate states. His later work, *Towards Perpetual Peace*, appeared in 1795 when Europe was on the eve of her struggle with Napoleon. In this he develops the necessity for republican or representative institutions, claims for each state the freedom to control her own affairs, and pictures for the future a world-federation of such free states.

The cynic may smile at both prophetic figures, Condorcet, hymning an age of peace and truth before he flees from the storm of fierce passions and viler calumnies to die alone in a damp cell at Bourg-la-Reine; Kant, hailing the advent of a world-republic at the moment when Napoleon was about to extinguish the liberties of half a continent and drown Europe in blood. But we may bear the smile. These men, in spite of seeming contradiction, were truly the spokesmen of their time. The conflicts and calumnies, the bloodshed and self-aggrandizement belong to any age; they have been lessened by the lives of the great humanitarian leaders

of the eighteenth century. The really typical utterance of any epoch is that which rises inevitably from antecedent history, yet gives a new outlook to the new generation,—thoughts which are stirring in many minds, and ring out in the voices of genius and insight. Of these Kant and Condorcet were two, among a host so great and varied that many names have been given to the period in which they lived, besides that of the 'Revolution'. It was the time of Enlightenment, the Age of Reason, the return to Nature, and in somewhat later times the Romantic movement. Through such a maze of interests we must keep our eye fixed firmly on the leading thread we have followed throughout, if we are to reach any conclusion.

But there is one coincidence of dates so striking that the narrowest summary could not pass it by.

In one year, 1770, in the midst of the crucial inventions of industrial machinery, three men were born, all of the first importance in forming the modern spirit from that mass of eager, expectant life which filled the latter part of the eighteenth century. They were Hegel at Stuttgart, Beethoven at Bonn, Wordsworth at Cockermouth.[1] The genius of each was proudly, even fiercely independent, yet each combines with the others in that mysterious unity of texture of which we are aware in subsequent thought and feeling, and cannot understand without all its diverse elements.

Hegel contributes to this unity, not the vast super-

[1] J. M. W. Turner, the greatest exponent of Nature in colour, flourished also about the same time. He was born in 1775 and died in 1851.

structure of his logic which has divided all those who have applied their minds to compass it, but the simple fundamental notion of his Philosophy of History, that humanity is one progressive and perfectible being or organism, which advances by becoming more complete and reasonable. For Reason, as with Anaxagoras, rules the world, not as an outside force moulding mechanically the course of things, but Reason embodied in man, and finding in man's history its most perfect expression. It is a fuller and more poetical presentation than Kant's of the new doctrine of a united and progressive mankind: it lacks the strictness of Kant's argument, but it colours and commends its theme by many touches of imagination. African civilization is the child-life of mankind, Indian is based on a dream of life and the universe; while it is to Hegel that we owe the famous aphorism that the history of Greece is the life of a glorious youth, typified at its birth by Achilles and in its decay by Alexander.

Beethoven, as the master of modern music, may seem at first sight removed from our main subject. Yet, in music and life alike, he was bound up with all the movements of the revolutionary storm. He was won over by contact with the crusading armies of republican France, and hailed Napoleon as the new Prometheus of human liberty. He turned still more fiercely against him when he assumed a crown and trampled on those whom he had set out to free, wrote paeans of triumph for the war of independence and altered the title of his *Heroic Symphony* into one to celebrate 'the memory of a great man'. His art shows that the relation between music and social conditions rests on a wider and more permanent

basis than the inclinations of an individual. For modern music, and Beethoven's above all, expresses more movingly than any words the deepening of feeling, the mingled cheerfulness and pathos, the straining to the further shore, the heaven-storming shout of triumphant humanity, which inspired the Revolution. Music was always social; this music, more than any other, bears clearly the impress of its origin and nature. No proof could be more cogent of the reality of that growth of human sympathy which is one aspect of our theme, than that music has become, since the middle of the eighteenth century, the characteristic and pre-eminent art of western Europe.

Wordsworth was the third of the great men of 1770, and long outlived the others. He had the special mark of greatness in combining intense national and local feeling with universal sympathies which bound him to the Revolution. It is the latter aspect which appeals to us here. Two distinguished features in Wordsworth's teaching thus stand out and proclaim him a fellow-pioneer with Lessing and Goethe in Germany and Rousseau in France, of the new and simpler order of thinking and writing which must form a part of any world-movement including rich and poor, all nations and colours, in one community of sentiment and purpose. These are his preference and defence of humble people, common themes and simple language; and his revelation of the latent feelings which we all have in us towards the common facts and sights of nature and which he proclaimed to be religious. In each respect Wordsworth was the most powerful voice that turned

men 'back to Nature' at the close of the century. The 'Prelude' well describes how the two passions grew together in his mind, the love of nature and the love of man, and how the great drama enacted in France affected at each stage the sympathies of one who viewed its commencement with enthusiastic hopes, and felt it a 'bliss to be alive', 'with human nature seeming born again'.

We may well enter France in 1790 in Wordsworth's company. She was standing 'on the top of golden hours'. The Bastille had fallen and with it the whole fabric of feudal privilege. The King had accepted the Constitution, and, as Wordsworth landed at Calais on the eve of the 14th of July, the whole country was preparing to celebrate the first anniversary of the national deliverance. On the Champs-de-Mars in Paris half a million persons were assembled from all the eighty-three departments into which France had just been divided, and there they witnessed the king swear to their new charter of freedom and pledged their own faith. Wordsworth saw only a reflection of the scene in Calais and the towns and villages he passed on his way to Paris, but even in 'mean cities' and among the few he noted 'how bright a face is worn when joy of one is joy for tens of millions'.

It was here that Wordsworth with a poet's insight reached the heart of the movement. The Revolution, which was to unfold itself in so many blood-stained pages and end in national disaster and apparent reaction, was essentially universal and rested on a growing sense of the common rights and feelings and powers of all mankind. No less a formula than this will fit the

facts, and it differentiates the Revolution sharply from the previous movements, especially in England and the United States, which many revolutionists used for comparison and encouragement. The English Civil War and the succeeding Revolution were essentially constitutional. There were acts of war of many kinds, but both the war and the political changes which followed it were carried out by men whose first desire was to re-establish and make clear what they believed to be the law and constitutional practice of the English state. Cromwell's work was national, though the sequel in the hands of William III became a dominant factor in European politics and the ultimate result was the world-wide imitation of the English Constitution. The English movement aimed primarily at widening and clearing the course of that stream of precedent which brings us our freedom. The French Revolution differed, both in the previous preparation of the country which gave it birth, in the general state of men's minds which stimulated it, and in the results to which it tended.

We shall see how in the end the general ideas on which it rested were forced to realize themselves by the slower and more ordered methods of which England was the prototype, how Germany was at this crisis drawn into the triple group of the really leading Powers of western Europe, and how after the turmoil of revolution the commonalty of mankind became steadily a greater and more substantial thing, drawing closer together, improving itself within and subduing with increased vigour the powers of earth to its service.

How was it that, when, in the eighteenth century, the great humanitarian ideas, born of science and the passion

for reform, pressed to the front, they found their natural home in France, and yet desolated it before they came to years of discretion? The answer, as always, is a historical one, qualified by geography. As England was marked out by national and physical characteristics to be the scene of the industrial revolution, so France, the central country of western Europe, had long been the clearing-house for new ideas, the exchange for the intellectual currency of Europe.

In no previous age was this so much the case as in the eighteenth century, when Voltaire, the greatest sifter of notions and popularizer of ideas, became master of the exchange. He did more than sit at his central office; he travelled on his business, importing the ideas of Newton from the rich but somewhat isolated market of England and personally introducing them to the barbarous court of Berlin. The currency of French was indeed at that time so great that Gibbon and many English writers were almost as much French as English. France was the second fatherland of every civilized man and gained education for herself from the wealth of ideas that passed her doors. But while thus intellectually stimulated and enriched, she was not socially so strong or compact as England, nor so ready to pass without a violent break from her feudal state to the new conditions called for by the gospel of equal rights, equal opportunities and the union of all.

France was more centralized and less united than England. The paradox explains both the possibility and violence of the Revolution, and its failure at the first attempt. Just as the feudal system had been more complete in France than in England, so the triumph of

the Crown in the sixteenth and seventeenth centuries had been more absolute. Whereas in England the Crown had survived by making terms with the local nobility who stood for the whole country, in France the Crown had struck them down and drawn the remnant and their successors into a separate world of its own, the *noblesse*, ranged against, instead of at the head of, the rest of the nation. In England the Petition of Right looks back to Magna Carta and leads on to the settlement of 1689, when the aristocracy is put in power. In France the Crown establishes in the seventeenth century an absolute authority by its 'intendants', unchecked by Parliament, and the nobility become the satellites of Versailles. At the Revolution therefore the men who could seize the central government had at their command a perfect instrument of despotism, but not a homogeneous people. Compare the history of the identical words 'gentleman' and 'gentilhomme'. The latter becomes restricted to a caste, to those of 'gentle' or noble birth. The former gradually loses its connotation of blood, and is applied, practically with the consent of all, to those whose manners and general breeding evoke respect. England was held together by her local liberties and by the local power of that 'gentry' which in France abdicated in favour of the Crown, and fell with it.

This horizontal fissure in the social structure of France before the Revolution accounts for the collapse of the attempt to carry out the scheme of national reform with the king at the head. New men, new ideas surged up from below, captured the more active and intelligent part of the population and coerced the king. But they

did not really possess him. He was surrounded and held by the intervening layer of the privileged and obstructive nobility, small in number but compact, and cut off by generations of caste feeling from the mass of their fellow-countrymen, fighting, when at bay, with the tenacity and personal courage of their order. Hence history seems to have determined a violent issue to the movement, and, as the inevitable sequel to violence, a temporary reaction.

But though we are right to seek in the Old World, and especially in France herself, for the main springs of the revolutionary movement, the New World also played a memorable part. The new communities had been growing there for nearly two hundred years, in ample space and free from the old ties of class and of religion which were to make the transition to a new order in Europe so difficult. Already, more than a century before, the New World had given the first example to Europe of perfect religious equality before the law, when Roger Williams, a New England minister, educated at Pembroke College, Cambridge, had founded in 1636 the settlement of Providence, on the new principle, still thought dangerous in America, of complete separation between religious and civil affairs. Even a hundred years later Rousseau would have punished with death a citizen who did not accept his new and simplified profession of faith. In 1776 came the more telling example of the Declaration of Independence, and the war in which the French had given decisive help to the revolting colonies. Franklin, the hero of the lightning discovery, arranged the treaty between the States and France. Lafayette,

who served twice with the army of independence in America, returned to command the National Guard in the earlier stage of the Revolution. So the connexion was close, and when the French constitution-makers sat down to draw up the first of their documents, they borrowed verbally the opening language of the States, 'Men are born and remain free and equal in rights. Social distinctions can only be based on social utility.' But the United States were a new country in the hands of careful and conservative men, while France was an old one in the hands of revolutionists.

It was little more than two years since Wordsworth had seen the general rejoicing and friendliness, the welcome to all mankind, of 1790, before the dream had vanished and France was in arms against the world. The invitation had become a challenge and the gage of battle was the head of a king. With all its horrors and the personal littleness of many of the leading actors, the story will always remain an immortal heritage of the human race, ranking beside the defence of Athens against the Persians, and of Holland against Spain, on the roll of those heroic national forces that have stood victoriously against overwhelming odds, in the interest of a cause greater than themselves. For in spite of defections and revolt it was the real France which answered to the call of Danton and marched out to Valmy and Jemappes, as the real Greece left Athens and met the foe at Salamis. There were defaulters from both camps, and modern France was to be made by the regrowth of its true though mutilated national being, till it had put on again its full strength and healed its wounds. The court and the

nobility had been now cast off and were in arms against their country, while in the rear were Bretons, men of La Vendée, faithful Royalists and Catholics everywhere, who could not reconcile their old beliefs with the new national crusade. But it was the true France, the France of the future, that went forward; and she carried with her not only the national interests but an ideal of universal good.

It is as essential to understand this as it is to understand that later in the struggle England did right and played an almost equally heroic part in resisting the Revolution when it became oppressive. What then were the precious gifts which France in arms was defending for herself and offering to Europe? And at what point could it become lawful, even imperative, to oppose the French if they were the apostles of a new era in human progress? The second question may be best dealt with first: Wordsworth in his life-story and Kant in his penetrating view of the conditions of human progress will indicate the answer.

Wordsworth stood by the Republic, after the September massacres, after the death of Louis, until 'Frenchmen became oppressors in their turn and changed a war of self-defence for one of conquest', losing sight of 'all which they had struggled for'. The invasion of Switzerland, the suppression of national rights by Napoleon, till 'to close and seal up all the gains of France a Pope is summoned in to crown an Emperor'; these were the catastrophe of freedom. Kant's principles would have passed the same judgement, with an even further outlook. For, while Wordsworth was thinking above all of

personal liberty and happiness, Kant was seeking the pathway to a state of universal peace and unity, where individual aims and characters, essentially different, would be harmonized by common sentiments and interests. But to secure a strong and healthy whole the parts must be intact, and therefore he condemned all invasion of the rights of one people by another. It must be a union of free and independent nations that will form a world-society.

Somewhere between the disinterested enthusiasm of 1790 and the end of the century the tide of French action had become retrograde. The precise point need not concern us. The new aggressive spirit which swallowed up the humanitarian ideas of the Revolution, did not arise primarily from Napoleon, though he personified it and gave it vigour. It sprang from the intense national passion that challenged the world at Valmy and marched on to unexpected triumphs. That when it reached this phase, it was incumbent on the threatened states to defend themselves, we need not stay to argue; and that the final issue was then inevitably a temporary set-back to the early hopes of freedom and progress is equally self-evident. The stream of history had in its central course become a raging torrent, and the flooded country-side strove for a time ineffectually to check and dam it.

But for clearance the flood and the rapid are powerful agents, and the destructive work of the Revolution was in many points as useful as the slower construction which followed and in which we are taking part.

We saw in England how the industrial revolution,

aided by the new doctrine of *laissez-faire*, had gradually removed the mediaeval restrictions on the free movement and free organization of workmen and employers. In France the clearing work of the Revolution was comparable, though it had a wider sweep. It carried away in a moment a host of inequalities, of feudal privileges and restrictions, of differences between province and province and man and man, which Turgot and other reformers had laboured in vain to remove. The feudal dues and rights of the seigneurs were surrendered in one famous night, within two months of the assembly of the States-General. The relics of actual serfdom which still lingered in certain places soon followed in the torrent. New 'departments', of similar constitution and with no barriers of customs, took the place of the old 'provinces'. In all this the Revolution was but completing at a stroke a natural progress which all enlightened men had wished to hasten. It was essential that obstacles to the free union and activity of citizens, which had descended from an age before the modern state had been conceived, should be removed, in order that the nation should combine strongly on a new basis, and take its place in the coming world-society of vigorous and independent states. The conquering armies of Napoleon did something of the same work in many corners of the Continent, sweeping out obstructive and effete abuses and preparing the foundations for future building. In Germany serfdom was abolished and the ghost of the old Holy Roman Empire laid at last.

In another and a wider sphere the leaders of the Revolution did their part to remove the greatest of dis-

abilities to the free union of human beings over the whole planet, by attacking the institution of slavery. On this the French leaders were by no means the first to speak. The Quakers in England, following their founder, George Fox, had been the first united body to denounce it. Thirty years before the Convention they had decided to excommunicate from their society any one concerned in the trade, and before the Revolution began they had formed an association for the 'relief and liberation of the Negroes in the West Indies'. Nationally, however, the French anticipated us by their society called the 'Friends of the Blacks', which, with Condorcet at its head, was working for the abolition of slavery itself, while the general English movement under Wilberforce was still concerned only with stopping the trade. In 1794 the Convention freed all the slaves of Haiti, but, through the reaction in France, England attained the final goal of general emancipation in 1833, twelve years before her revolutionary neighbour.

These things, and many more, might in the broad sense be classed among the destructive activities of the Revolution, in removing obstacles to free individual and national development. Looking at Europe as a whole, and limiting ourselves for this purpose to the period ending in 1830,—a useful date,—it might perhaps be said that it was on the destructive side that the Revolution was most effective. Yet even in the height of the party struggle and the utmost stress of the fight for national life against the invader, the Convention succeeded in launching schemes of constructive reform which have occupied generations since to carry fully into effect. The

'principles of the Revolution', therefore, were not empty formulae, though often transcending the executive powers of the men who enounced them, or the age that first saw them written on the orders of the day. The Convention which sat for three years, from 1792 to 1795, did the constructive work of the first French Republic. It not only defended the country successfully abroad and welded the nation together at home, but in numerous committees took up great subjects that called for reform, and in each case left fertile suggestions or large masses of work done and only needing completion or application. We can only mention two here of special magnitude and importance. They touch on our main theme, one looking back to the Romans, the other forward to the still greater work of raising the whole mass of the population to a state of full citizenship, which is one of the first tasks of the succeeding century.

The first is what is commonly known as the Code Napoléon. It was a commission of the Convention which first seriously undertook the task, long needed, of codifying French law and bringing it up to date. It handed on the draft to be completed under the Directory and issued by Napoleon. It looks back to Roman law in the sense that the old French law which was its basis was derived from Roman, and also in the fact that when revised in the light of the Revolution, it became another complete code, like that of the Roman Empire, which could be, and was, largely adopted by other countries both in Europe and in Central and South America.

The second great undertaking of the Convention was its scheme of national education, in which Condorcet

had been the moving spirit. In this, as in its distribution of State property and the institution of a popular public debt, it aimed directly at equalizing opportunity as well as means, and enlisting all possible talent and interest in the service of a united and efficient state. The universal popular schools, though planned, were not at this time carried out. They waited for general introduction till almost the same moment as in England, the decade of our first Reform Bill. But many of the higher and central schools in Paris were actually established by the Convention.

The mere fact, however, that the Convention stood for the nation and did these things, and all else that it attempted, in the name and interests of the whole people, was in itself more important than any particular law or institution. It was the embodiment of popular sovereignty, the first assembly in any great European state elected by all citizens over twenty-five (later twenty-one) years of age, domiciled for a year and living by their own labour. Standing as such before France and before the world, and standing successfully at such a time, its influence can hardly be exaggerated. It was a potent stimulus both to nationality and democracy, two guiding stars in the succeeding century.

Slightly as they have been touched on, we have yet in this chapter given more details of a few years' history of one country than will appear in any other. The impulse to do this is irresistible. The revolt against the Church, the recovery of the ancient world and the appearance of a new one, the undreamt-of expanse of human powers by science and invention, the limitless hopes of further

advance and general happiness, all converged in men's minds about the mid-eighteenth century and created a reasoned passion which in its higher form was a new religion. We see the country in which this was most deeply felt, suddenly awake and begin with feverish haste to apply its enthusiasm to mending the faults in its own state and preaching amendment to all its neighbours. The excitement is breathless. We follow the fortunes of every actor, and of the whole country labouring in the great experiment, with closer interest than any other period of history can evoke. In the thrill of the conflict, under the fascination of the play of personal character, we are apt to overlook for the moment the onward march of the same causes which led to the upheaval in France and have continued to transform society down to our own time. Industrial development in England, abstract philosophy and literature in Germany, ideas of progress and reform in France, these were the most active general forces in the three greatest Western nations at the end of the century, and the Revolution altered the balance of each.

In Germany the shock aroused the national spirit which had been sleeping in the midst of the most brilliant intellectual development which Germany has ever seen. The conquering armies of Napoleon kindled a flame which Goethe had never cared to light. Prussia on land, and England by sea, had finally subdued Napoleon and driven France back to her old boundaries and, for a time, to something like her old régime. In the process the foundations of modern Germany were laid and Prussia established in the hegemony of the Teutonic people. The

greatness of Germany in the century which follows is due, partly no doubt to the intellectual giants of Goethe's age, but still more to the stern discipline of the War of Liberation and the faithful service of those who enlightened and built up the Prussian state at the lowest ebb of its external fortunes.

The relations with England were, however, the most important external aspect of the Revolution. While the honours of Waterloo are divided, the leading share of England in the whole war is incontestable. It was our greatest national effort. Except for just over a year after the Treaty of Amiens, we were continuously at war with France for over twenty years from the execution of Louis in 1793 till 1814 and Waterloo. The cost was mainly paid by English money, and we accumulated debt about equal to the whole of our present National Debt. But since 1815, when British trade and British perseverance secured their reward, the peace with France has been unbroken; and now the good understanding between France and England has become a decisive factor both for the war and the future of the world.

This friendship, following so many conflicts and one last determined struggle, must have deep causes. Our next chapter will suggest some of these, and the war is now testing their strength. The Napoleonic struggle was determined by the greater wealth and national coherence of England and the fact that she stood then as she stands now for the liberties of Europe. Her victory was the vindication of the social truths that progress must be subordinate to order, that violent changes will bring

violent nemesis, that every country, while advancing towards the common goal of general prosperity and happiness, must do so on lines marked out by its own genius and history. England, strong on this side, was weaker in her appreciation of general ideas, in daring obedience to the dictates of reason. France wanted the stability and continuity, the tenacity and self-restraint in which England was superior.

A new epoch seems to open when men arise who aim at reconciling both ideals, and nations settle down to social reform without revolution, to moulding the future without breaking with the past. Progress after the Revolution, the work of the nineteenth and later centuries, unites the spirit of Burke and Condorcet in a common purpose.

II

PROGRESS AFTER REVOLUTION

All the great sources of human suffering are in a great degree, many of them entirely, conquerable by human care and effort.

JOHN STUART MILL.

Nearly a century has passed since the settlement of 1815. The main features of this period have left a clear and universal impression on the popular mind of the western world. It has been an age of progress, of big things, of vast increase in knowledge and wealth and human power. The size of our wonders alone is overpowering, and that is in truth the least part of the marvel. Ships now cross the Atlantic which could have carried Columbus's caravel as one of their life-boats. Single buildings scrape the sky which would have covered the whole site of Cnossos and shot above the Tower of Babel. Many a financier owns to-day more wealth than any government could have commanded before the age of progress began. 'England was then a mere nothing,' wrote a little girl the other day, moralizing on the effects of the industrial revolution. Judging by any table of weights and measures, we should have to agree with her: and some would add that, compared with the 'wonderful century', science and human power and ingenuity were a mere nothing also. The popular view is by no means to be despised, as many of the greatest thinkers have told us from Aristotle downwards; and in this case the belief itself that progress is the mark of the age, is one of the most powerful factors in producing the movement. But it is not quite new in the world. The prevalent tone of recent decades, the talk of the 'wondrous age' and the 'wonderful century', takes the mind back to the glowing dreams of Condorcet and the pre-revolutionary days. It descends indeed directly from them;

but when we begin to look more closely, we shall find some interesting and significant differences. There was in the earlier paeans more call for destruction, the breaking of chains and the freeing of slaves: the later are full of things accomplished, the triumphs of engineering and the wonders of science. There is more construction to record, and evils and necessary changes are not so prominent in the picture. If this is to the good, another difference is less satisfactory. The older visions dealt more with the coming improvement in human nature, the infinite possibilities of goodness as well as knowledge. The later are more material, and celebrate the conquests of nature, the accumulation of power, and the increase of comfort.

These are but vague impressions. We will analyse a little further and see how far the maze of modern events follows the working of those main threads of progress which we are tracing throughout. The popular view, though largely justified, is crude and external; the facts themselves increasingly complex and multitudinous. Perhaps we may find in the continued development of certain leading features of the past both a guide and an encouragement in the perplexities of the present.

The striking things, which seem to symbolize the age, are great works of construction and organization, implying both a high degree of mechanical skill and the command of vast masses of capital and labour; the Railway and Shipping Company which spans a continent and encircles the globe with its steamers; the giant ship which carries a complete town of toil and pleasure across the ocean; the gun which can annihilate a fortress and a company of

men miles away with unerring precision. All these rest ultimately on the powers of which we sketched the earlier stages in the eighth and ninth chapters—mechanical science, inventive and constructive skill, and the organization, or working together, of large businesses and bodies of men. Each factor, the calculating science, the constructive skill, the combination of men, appears now, in the last stage of our sketch, as the developed form of some simple element which we noted for study in our opening chapter. Each has grown like the tree from the seed.

But we need a correction in the popular, concrete idea of progress, which we should gain from such a symbol as an ocean liner. The science is obvious, and the mechanical skill, the brute force and the control of natural powers, even the co-operation of myriads of men, is clearly seen in the voyage itself and the successful working of the ship. But what are the terms of this co-operation, the motives and the goal of the voyagers, the human aspect of the whole adventure? It was on this side, as we saw, that the men of the Revolution were most set, and we should expect to find, if there is truly life in the past, that when the reaction of 1815 was over, the effort to secure more equal and humane treatment for the whole population and greater social union among all, would be resumed and take its place as one, perhaps the foremost, of the deliberate aims of mankind.

It has been so; but it is not surprising that this human movement, of which we are ourselves a part, does not in a casual glance so much impress the mind as those imposing external objects which appear as symbols of the power

and progress of the age. But it is equally fundamental, and closely allied with the science by which the conquests of nature have been secured.

We will say here first the few words that are possible on social reform, then pass on to the extension of science, especially in its relation to the conditions of life, and conclude by showing the intimate connexion of both social reform and science with the growing unity of the human race.

The reaction which followed the downfall of Napoleon wore itself out in the succeeding decade. Signs of restlessness soon began to show themselves in France, and in several smaller countries of Europe and America the rising spirit of nationality was active in the decade between 1820 and 1830. Before 1830 arrived the Belgians had broken away from Holland, the Greeks from Turkey, and England, at Canning's instigation, had recognized the South American republics revolted from Spain, thus 'calling into existence a New World to redress the balance of the Old'. But 1830 is the year from which our present period of constitutional and progressive reform may be best dated.

In France in that year the Revolution of July set up a middle-class limited monarchy on something like the English model, and in England the Duke of Wellington ceased to be Prime Minister, to be succeeded by Lord Grey with a pledge that parliamentary reform should at last be passed. 1830, too, is memorable as the year in which the first railway for passenger traffic was opened between Liverpool and Manchester. The immediate and abundant fruits of the Reform Bill, and the quickening

current of democratic feeling in France, showed that the humanitarian ideas which gave rise to the first Republic were now to resume a tempered sway. Before the middle of the century both France and England had emancipated their slaves abroad and begun to organize with public money a state education for all their citizens at home; England had carried Factory Acts which extended much further the protection of the workers begun in 1802, and by repealing the corn-laws had thrown open to her growing population the granaries of the world.

The Reform Bill in England and the Revolution of 1830 in France thus nearly coincide as a useful chronological point whence may be dated a parallel series of popular reforms in both countries. It has also a strong personal interest for Englishmen as the meeting-point of the life-work of our two most powerful and representative figures on the roll of humanitarian feeling and reform. Bentham died in 1832 and Dickens published his first book of stories in 1833. The former, trained on pre-revolutionary literature, combined French culture with English conservatism and common sense, and brought eighteenth-century ideas into the Victorian era. The latter was to become the great exponent of English humanity in the nineteenth century, the apostle in imaginative literature of universal kindliness and social and educational reform. Both are of capital importance to our theme.

Bentham is by common consent the moving spirit in the group of philosophical reformers in England which became active when the reaction of the war began to pass away. But his work and ideas have far more than this temporary

fitness: they express in a luminous and precise way practical principles which were to mould public action during the succeeding period. A singularly clear and ordered mind enabled him to arrange a confused mass of legal and political practice in the light of simple principles which he adopted from others. The 'sensational' school of eighteenth-century thinkers, especially Helvétius, gave him the root-idea that pleasure must be the object of all individual action. He generalized this and deduced the simple and practically beneficial conclusion that the pleasure of all, or 'the greatest happiness of the greatest number' should be the aim of all public action and the test of private morality. The great phrase came probably from Priestley, but Bentham gave it application and currency. He had a happy knack of coining useful words, such as 'international' and 'utilitarian', the latter of which soon became the designation of a school of thinkers. His most important book, the *Principles of Morals and Legislation*, was published in the revolutionary year 1789, and on the strength of it he was made a French citizen by the National Assembly in 1792. His immediate fame and influence were greater abroad than at home. But in his later years he gathered round him in London that group of philosophical radicals, James Mill, Brougham, Romilly, Francis Place, whose influence was perhaps the most powerful factor in mid-nineteenth century England. Bentham's own chief contribution to progress was the reform of the law on lines of greater simplicity, and what he called 'utility', which we should now better understand as 'humanity'. He had in himself a humanity which commended his principles and endeared his person to all

who knew him. With the truest characteristic of humane feeling it went beyond mankind and embraced the lower animals. He was a pioneer in the crusade for including cruelty to animals among offences cognizable by law. It was a new idea in his time and only gained admission to the Statute Book in his old age. But it is largely due to him that, though still imperfect after many amending Acts, our own law in this matter is in advance of many other countries, and that other countries have followed where he led the way. He, too, and his disciples, had the main share in mitigating the ferocity of our criminal law which up to 1832 was still hanging persons, even youths of fifteen, for thefts of over five shillings in value.

In the year before his death he wrote in an autograph for a friend, 'The way to be comfortable is to make others comfortable: the way to make others comfortable is to appear to love them: the way to appear to love them is to love them in reality. Probatur ab experientia per Jeremy Bentham, Queen's Square Place, Westminster. Born Feb. 15: anno 1748. Written 24 Oct. 1831.'

Through James Mill the succession of reforming opinion is complete from Bentham to John Stuart Mill and many men who are still alive and active among us. The root is there; the tree has become so many-branched and so widespreading that no one can compass the whole, and we are inclined to forget the slim but sturdy sapling that was planted in days when men still discussed and believed in general principles. But though we can trace back the contemporary social movement to its historical antecedents, two changes in spirit and method have taken place

which would almost remove it from the ken if not the approval of the men of 1832. It has become in the first place incomparably more detailed and scientific. This they would probably have recognized as an advance. And in the second place it constantly invokes the authority of the state in a way which they certainly did not foresee and would probably not have welcomed. Each of these changes assists the main process which we are tracing in these chapters, but in diverse ways. That social reform—the improvement of health, of education, and of the conditions of labour—should become a more and more detailed and specialized business is the condition of its closer connexion with science; and science justifies itself most completely when it is able to enlighten and ameliorate the lives of all. No natural laws can be more imperative or bind us more closely and permanently together, than those which science reveals to us as the basis of our own life. But that the application of these laws should be enforced by state-control is clearly a matter of expediency from time to time.

In our own day the intervention of the State has no doubt had the effect of consolidating both the nation at home and nations among themselves. Next to conferences on purely scientific topics, no recent movement tends so directly to bring the nations together as international meetings for the discussion of similar social problems between different countries. And at home the strong hand of the State, compelling us all to common action in the common interest, has been a wholesome corrective to the anarchy of feudalism and the individualism of the Renascence and the Revolution. But whereas the unity

of thought and action which science imposes is unavoidable, and soon becomes a part of our common nature as human beings, none of the regulations of the State have this inevitable character. A whole society will submit to them and even demand their imposition: but men alter them constantly and in some cases grow out of them altogether. It requires no law now to compel the vast majority of any civilized community to give their children the elements of education. And so while some of us are thinking that all this state-regulation must end in a society where the State is universal owner and lord, it is open to those of another temper to hold that the State is but a schoolmaster to bring us to Love—the 'enthusiastic love of the general good'.[1]

It would only confuse our argument to give details of the progress of social reform in the past century. With a certain ebb and flow, the stream has gone on broadening and deepening, especially in the last few years. Is it not written in libraries of blue-books and specialist treatises? But one of the three main branches, that of national health, illustrates in a curiously complete way that co-operation of different nations and various departments of human activity which it is our special business to consider. Among the most certain and important facts in the social history of the time, facts which find no place in the ordinary text-book and teaching of history, is the enormous advance in public health and the average expectation of life, in our own and other civilized communities of the West. Some diseases, such as typhus, have almost disappeared and nearly all show a notable

[1] J. S. Mill.

decline. The one striking exception is cancer. Now the whole of the statistics of health, on which this conclusion is based, which justify experiment and direct public action in the matter, date from the decade which we noticed as the beginning of serious and continued effort at reform. The Registrar-General's records of the death-rate and its causes date in England from 1836, just four years after the death of Bentham and the passing of the first Reform Bill. The records kept have constantly become more extensive and scientific ever since, until quite recently, on the initiative of France, an international Nomenclature of Diseases has been drawn up, which has already been accepted by about a score of different nations or communities. Here is a case of the direct application of scientific knowledge to the amelioration of life with immediate and palpable advantage; and neither one science, nor one nation, marches alone. Statistics involve high mathematical capacity, and sanitation, with all the mechanics, physics, and chemistry it contains, has contributed probably as largely as pure medicine to the improvement in public health which has been attained. All civilized peoples are engaged in alliance on the same task; West aiding East in those heroic and successful attacks on disease, in which many great lives have been already spent, France and England conspicuous with Pasteur and Lister.

Other branches of social reform would furnish similar instances, education, the hours and remuneration of labour, and the art of social legislation itself. Those will be most effective which rest most clearly on the best established science, and in the case of health we are brought in touch with that branch of science, biology,

in which the characteristic development of the nineteenth century took place.

We noticed that in the seventeenth century, when the first great construction of modern science was made, the attention of all the leading minds was concentrated on attaining a consistent account of the mechanics of the known universe, the inclusion of the physical properties of matter in enlarged and corrected mathematical formulae. The Royal Society was founded to promote 'Physico-Mathematicall Experimentall Learning', and this remained for long the prevalent drift of scientific studies. In the eighteenth century chemical discoveries and classification were the prominent feature. Cavendish and Priestley, while continuing the advance of physics on mathematical lines, laid also the foundations of a new and independent science by the analysis of air and water, and Lavoisier brought the newly discovered chemical facts together and gave them scientific classification and co-ordination. The nineteenth century constituted biology. As with most crucial steps in the progress of knowledge, the name and the root-idea appeared independently at the same moment in different countries. A French thinker, Lamarck, and a German, Treviranus, published, within a few months of the beginning of the century, works containing the same new term 'biology' which was to describe the new science, and the same fundamental notion of descent with modification. The question of priority is trivial. The fact of simultaneous and independent discovery is the best proof of the greatness and opportunity of the event. It was, as we shall see, connected intimately with the general doctrine of

the continued progress of all human things by small and regular changes. But biology was to demonstrate this vague conception of the philosophers by concrete examples of forms which could be seen and recovered from the rocks, which could be connected in an unbroken series, submitted to the eye, and traced and measured by the hand. The idea was to become for the sciences of life what Newton's law had been for the sciences of matter. But, though its first enunciation in the first decade of the nineteenth century is a striking fact, we have to wait till the middle of the century for cumulative evidence, a working hypothesis, and popular acceptance. The half century passed: here and there a thinker would again affirm the principles of Lamarck and Treviranus; at last, in 1858, another double and independent discovery took place, and Darwin and Wallace announced Natural Selection as the *vera causa* of the changes in species which the earlier biologists had proclaimed in vain.

However Darwin's theory is finally modified, it remains the dominating influence in all the sciences of life. It transferred the centre of interest from the life of the individual to the growth of the species, and made a similar change in biology to that which the seventeenth century made in ancient mechanics by introducing laws of motion. Questions of origin and growth, which had begun increasingly to interest historians from the time of Vico onwards, now invaded the whole realm of animate nature; and for a time there was a danger that human progress itself might be explained by a law of struggle such as Darwin postulated for the survival of the fittest. 'Sociology,' the term introduced by Comte in 1830 to

indicate the laws of human, as distinct from animal, evolution, suggests the truer line of approach for human problems. The same law of struggle must, at times and places, act between human individuals and even communities, as it has been shown to act in modifying species. But with mankind the higher law prevails, of development by co-operation.[1]

Darwin's law, moreover, becomes itself another and potent link in the unification of mankind, for like all science it brings together the co-operating and consenting minds, and also gives us an objective unity among things outside us which were before regarded as separate beings. In the light of a general law of evolving life, all animal and vegetable species appear as branches and twigs and flowers of one great tree springing from a common root. Earlier thinkers, from the Greeks onwards, had partial and fleeting glimpses of this conception. The capital achievement of the last century in science was to formulate it in a fully articulated shape, adequate to the facts, and to suggest causes which might be imagined collectively to account for the process of development. In this case, as often in studies of such infinite complexity as the phenomena of life, the plan was the thing. Particular questions of cause and effect will in countless instances remain perhaps for ever unsettled. But a good plan has brought order into chaos, and ranked the battalions of workers in marching array.

On the other side of science, the physico-mathematical, the discoveries made in the same period, since serious reform began in the thirties of the last century, have

[1] Pliny's 'Deus est mortali iuvare mortalem'.

tended with remarkable unanimity to the same end of bringing together things previously thought unconnected, shaking our mental composure and ultimately inducing a more profound and intimate unity.

It would probably be agreed that the three most important groups of discoveries were :

1. Those connected with the conservation of energy, and especially with the names of Mayer and Joule before the middle of the nineteenth century.

2. The results of spectral analysis about twenty years later.

3. The revolution in our ideas of matter caused by fresh light on the nature of electricity, first thrown by Faraday, Maxwell, and others fifty years ago and increased amazingly since.

Each case showed identities, previously unsuspected, between different physical phenomena, and led the mind on to imagine still wider harmonies in nature to which our own souls and the world-society in which we live must one day be attuned.

Joule's discovery might be taken as the type, demonstrating the equivalence of heat with other forms of motion, and dismissing to the limbo of metaphysical entities the supposed ' caloric ' or heat-substance.

The science of astrophysics which followed in the sixties is based on the analysis of sidereal light by the spectrum. The black lines in the spectrum which Frauenhofer and others had noticed and studied, were at last interpreted by Kirchhoff and found to be the means of identifying the chemical elements in the luminous body. The sun and stars, all known matter in the universe, thus came under a set of laws hitherto known

only to be true of terrestrial matter. It was another extension of the intelligible order which man's collective mind had achieved, comparable to that of Newtonian gravitation, though without the comprehensive sweep which the latter owes to its greater simplicity. It is a link between chemistry and astronomy, as Newton's was between astronomy and mechanics.

Of the last great moment in science, which now largely fills the public mind, it must be sufficient to say that, while it seems at first sight to conflict with the accepted mechanics of over two centuries, the latest writers assure us that reconciliation is possible. Again we see a new form of unification arise in the midst of a new world of unexpected forces and infinitesimal motions. Electricity, first roughly apprehended in two of its manifestations by Franklin, connected with light by Faraday, and used as the new motive power by the nineteenth century, now appears at last as the basis of all matter, or rather matter seen from another point of view. The subject is too vast and still too inchoate to have the social bearing which we are seeking. But it is clearly on one side a further instance of the identification of the previously distinct.

The growth of science is continuous because the roots are firm. Einstein follows Newton but does not displace him. The recent developments of biometrics have arisen from the work of Mendel and of Darwin.

In face of the most recent marvels, the electron in physics, the aeroplane in engineering, the idea of evolution, as applied to life at large, is still seen to be the weightiest fact which the last century of science has thrown into the scales of philosophy and progress. It

alone can be compared for social influence with the discoveries of the sixteenth and seventeenth centuries.

Just as we then saw the new theory of Copernicus taken up by thinkers like Giordano Bruno and woven into a world-embracing scheme which aimed at superseding the older views of life, so now the new tendency and the new discoveries in biological evolution combined yet more readily with current notions in philosophy to produce great schemes of thought and religion such as those of Comte and Spencer.

They stand here in illustration of the two leading ideas which marked the age and impress contemporary thought —the idea of unity and the idea of growth. Of these the former has been the constant aim of all ideal effort, since man began to speculate on the world and his own place in it. The latter was enforced in a novel way by the new views in biology which showed all creation labouring together in one perpetual birth, each type producing others slightly differing from itself, but all connected by ties of true relationship, and leading to a supreme type which could dominate the others and incorporate their best qualities in itself. In the growth of each human embryo man could even see reproduced before him all the earlier stages of his animal history. This miniature being confirmed the vaguer philosophic notions which had long prevailed, of a continued progress from the weak and savage to the strong and wise.

Thus science and philosophy both said, Growth and Unity in thought; and history and humanity answered, Growth and Unity in action.

We turn to see how far the course of international

politics bears out the idea of a strengthening common force in mankind. Between ourselves and France, and throughout the Anglo-Saxon world, there has been already a century of unbroken peace; and until the summer of 1914 there was a hope that the danger-point in European politics might be passed without disaster. The Concert of nations, precursor of the League of Nations of to-day—or to-morrow—had been busy with the Balkan problem. It failed, alas, to avert the second Balkan war; it failed still more disastrously to avert the determination of the Central Powers to humble, or rather annihilate, Serbia after the murder of the Archduke.

The war is now over and the victors are struggling amain with the problems of settlement which face them in almost every corner of the world. It is no part of our task to discuss these or to forecast the issues. But a few considerations may be added which appear to the writer to justify a continued belief in the main thesis which has been followed throughout, and a confident hope that the cause of human unity will ultimately prevail, and perhaps even gain by the terrible blows which have lately been shattering it.

The primitive and universal causes of war have clearly lessened as the world grows older. Restlessness, the habit of fighting, the greed of the individual conqueror, most of the impulses, in fact, which make young human beings and earlier societies habitually warlike, have been in modern times rapidly diminishing all over the globe. They are not the characteristics of modern societies. Nearly all recent wars have been due mainly to two causes, nationality and commercial rivalry, and these are factors conducive in the end to peace. They have been

often complicated and masked by other issues, as the Italian cause was mixed up with the personal weakness and ambition of Napoleon III. But the consolidation of national existence was then at the root in Italy, as it was in 1913 in the Balkans, and in a perverted form in the Great War. But we need not believe that the stamp of war will never wear off. Holland and Switzerland, which won their national existence by arms, are now the most peaceful members of the western world.

It was as pledges of peace that Kant postulated strong national units for the basis of his world-society, and, in spite of the dangers of exaggerated nationality, it is on these lines that the peace of the future will be won. It will rest, however, not on the aggrandizement of the great Powers at the expense of the small, but on the safety and strength of the latter under the aegis of international justice and common rights.

Commercial rivalry as a cause of war goes back, of course, to a time far anterior to our present chapter. It has been pressed so hard as a motive in history that one school of writers would make it the leading interest, and show us the eighteenth century as primarily the period of the contest between France and England for the markets of India and America. No one, remembering the conflict of Spain and England in the sixteenth, or of Holland and England in the seventeenth century, will underrate its importance. But even then it was by no means the leading motive. It played a prominent part, too, in the eighteenth century, though inferior to the other causes which were guiding events before the Revolution. In the nineteenth it has again been present, but

the curative effects of commerce have been at work even more vigorously.

For the links of commerce were always stronger than its jealousies. It thrives on intercourse and goodwill. In the last century of our sketch the ties on which it has been always based have been immensely strengthened by inventive and scientific skill. The globe is knit up by steamships and railroads, and still more closely by electricity, on wires or without. People are fed, and all our comforts guaranteed, by international links, forged by the engineers. The markets of Calcutta and New York are almost momentarily in touch with London, and the whole world-wide fabric of finance responds throughout to the first breath of alarm. Such sensitiveness and the certainty of heavy, perhaps irreparable, loss, if war once begins, have been safeguards of peace in many crises, and will, one may hope, act again with added force when the passions and upheaval of the war have subsided. Yet for the surest guarantees, the course of this sketch will have prepared us to look in another, though a connected, quarter. A common activity is a better defence than a common alarm; and those activities are most easily internationalized which contain most science.

Music has been sometimes described as the universal language, but it cannot, and should not, ever entirely throw off its local spirit. It must, however universalized, always express the soul of one man, or at most one society, at a particular epoch. Science is man's true universal language, and attains its end the better, the more its ideas and terms are unified throughout the world. This process we have seen to be constantly going on,

and in the last few years the international character of science, and work based upon it, has taken a concrete form. So many international associations, meeting regularly for scientific purposes, theoretical and practical, have come into existence, that centres have been formed to bring such bodies into touch. There can be no finality about such an organization; it will change and move, serving different aspects of international unity. But at least two such centres had already begun in places both well situated for the balance of Western civilization at the beginning of the twentieth century. At the Hague, in the home of Grotius, father of international law, and near the seat of international arbitration, offices were opened for an association of international societies, and Brussels soon followed suit. With the close of the war and the inauguration of the League of Nations, Geneva, in one of the sturdiest national and international communities in the world, becomes the centre of a world-organization for Peace. It will grow in strength with the support of the nations and it must be supplemented by other centres of international activity like those developed at Brussels and the Hague before the war.

Nor, in spite of the wholesale and fratricidal slaughter in Europe, will the general centre of civilized life pass yet to the New World. We have learnt much from the new communities across the ocean. They have put our life in a new setting and given us confidence and high hopes. The Atlantic has become for the modern world what the Mediterranean was to the ancient. Yet the centre of gravity remains on our side, and in the midst of the French, Teutonic, and English-speaking people.

Belgium, devoted land, where British troops have fought

in all the great wars for the liberty of Europe, is the natural meeting-place for the three leading Powers whose work in science, learning, and the arts must after the war, as before, be the greatest asset to the civilization of the world. We have spoken more largely in this sketch of the contributions of France and England, and traced in the last chapter the happy ending of the long rivalry of two complementary nations. But it is still more important at a time of extreme estrangement and overwhelming indignation to remember the great services which Germany has rendered in the past to the common lot. She was, and will remain, the mother of Goethe and Schiller, Herder and Kant, Humboldt and Helmholtz, as well as of the makers of the Prussian state and the Prussian war-policy of recent days. In particular, by a curious irony, the German, who appeared in the later nineteenth century as the least international or humanitarian of men, was a hundred years ago the pioneer in this very cause. It was Alexander von Humboldt, who by virtue of his many friendships, combined with scientific eminence, was able a hundred years ago to found international co-operation for scientific research. He persuaded first the Russian and then the English governments to give him points for simultaneous observation for his experiments in terrestrial magnetism. His still greater friend, Goethe, is by universal consent the most commanding international figure of the age.

Since that day the unification of Germany has been achieved, not by a slow, internal process, as with ourselves and France, but by violent strokes dealt north, south, east, and west, at their neighbours; and their strong,

unified state became immensely stronger by the concentration of all its efforts on the scientific development and organization of its natural resources and national life. We have seen the consequence in the loss of peace and happiness throughout the world. But this is not the end, nor is it the necessary issue of a united nationality. Italy, awakened to new life by the labours of Garibaldi and Mazzini, now takes her place in an alliance of free peoples. We may live to see the Germany which Bismarck forged, ready in another spirit to share the common life and aspirations of mankind.

12

LOOKING FORWARD

Is it not strange that a little child should be heir to the whole world?

THOMAS TRAHERNE.

We used to be told that the word 'Europe' was given to our continent by Greeks who looked across at it from Asia Minor and thought the coast offered a 'Wide Prospect' compared with their own 'muddy fens'. The derivation seems now to have gone the way of attractive myths. But the fact remains that the land they looked at, the smallest of the great land-masses always called 'continents', a mere peninsula of Asia, was to give mankind the wide prospect over his destiny and powers which we have seen broadening at each great step in history. The little world of the Aegean, which the Greeks, passing back from Ionia, made the cradle of civilization, was enlarged by Roman hands into the world of the Mediterranean, still a mere speck on the surface of the globe. But it contained the germs of wider expansion, borne into it both from Judaea and from Greece. The modern world is the result. The same circle of ideas, of knowledge, of activity, of human unity, has for three hundred years embraced the Atlantic, and in our own time is continued round the world in the oldest centres of culture in the East and the newest settlements of Europeans in the southern seas.

Heaven defend that we should think it final or all-sufficient, because it is all-embracing! All that we learn of the Eastern mind, and the newest philosophies of our own, combine to show us the limitations of the Western scientific outlook and to suggest the sides on which it can be deepened and extended. But the Western mind dominates the world. It has built up the fabric of science

and invention which is justified by success. It has formed the loose but very real alliance of the great material and intellectual Powers which can impose their will, when united, on the rest of mankind. It is, in fact, only by modifying this general will, by making it at once firmer and kinder, clearer and more enlightened in its main purpose, more considerate of the weaker things that cross its path, that any one people or individual can affect the destinies of the whole. Hence it must be the first intellectual duty of every Western to seek to understand the genesis and nature of this collective mind by which he is surrounded and controlled as his body is by the air. He breathes it willy-nilly ; if he is to fly in it or use it consciously for his own purposes, he must first learn its laws.

With the possibilities of future action it is not within our scope to deal. There is to be no chapter on Utopias. But there is one window on the future through which we must glance, though the view it gives us will vary with every gazer, and suggests quite other trains of thought than those which we have followed hitherto.

Our passage from age to age has revealed a continually widening expanse, not only of the earth-space that man unitedly controls, but of the scope of his collective thought, till, in our own day, he knows by personal visit nearly the whole globe and encircles it with his activities, while his thought has gone further than Newton or Galileo would have ventured, and analyses the stars, as well as describes the dance of the infinitesimal. Note, then, one of the most striking of those apparent contradictions which often meet us and make us almost ready, with Hegel,

to believe in the identity of opposites. It is precisely this man, with his most developed powers, with his scope of vision transcending the boldest fiction, with his knowledge and force embracing the world, who is for the first time in history profoundly interested and passionately attached to the smallest and weakest embodiment of the human spirit, the child in the earlier moments of his life.

The facts are eloquent. Our own is without question the age in which man's collective force and knowledge have reached their highest point. It is also that in which the care and love of children have taken their place as the first general solicitude of all civilized societies. No age before our own could have painted the picture of 'the innumerable children all round the world, trooping, morning by morning, to school, along the lanes of quiet villages, the streets of noisy cities, on sea-shore and lake-side, under the burning sun, and through the mists, in boats on canals, on horseback on the plains, in sledges on the snow, by hill and valley, through bush and stream, by lonely mountain path, singly, in pairs, in groups, in files, dressed in a thousand fashions, speaking a thousand tongues'.[1] No age before our own attempted the provision of public money which we have just made, which Germany and others have done before us, to assist the mother of a new-born child in giving it the best nurture and best reception in the world. No age before our own could have said, or understood the saying, of Froebel, 'Let us live for our children'. We have passed in some two thousand years from a time when the child was regarded as the creature, the chattel of his parents, and

[1] *De Amicis.*

might be abandoned, sold, or exposed to death, to a state of mind in which the child, dear in himself and full of possibilities, becomes of priceless value to the whole community, the flower and promise of the world. Just as he now appears the sum of all the past, the possession and hope of all as well as of his own kin, so we are prizing him more and more for himself, and looking in his own nature for the seeds of power and goodness. A higher individualism accompanies a fuller social conception of origin and use.

Let no one shrink from the conclusion for fear of illicit optimism. To recognize a new standard and a new achievement is not to ignore the multitude of glaring cases which fail to attain it. And there can be no more doubt of the new attitude towards child life than there is of the new linking up of the world by steamships and electricity. There are stagnant pools of barbarism still untouched by the main current of civilization, and cruelty and callousness to children still linger, with other defects from the normal standard of conduct and feeling. The significant point is that a new standard in the matter of children has arisen which sums up with singular harmony the leading traits in our sketch of progress and turns them towards the future in a way with which no other feature of our age can compare.

The child, then, in his measure sums up the millenniums of the growing power and unity of mankind in the past. This is no doctrine of transcendental mysticism, but a simple fact, plain to a moment's thought. The great fabric of science and social organization into which each child is born stands firm around us, independent as

a whole of the action or volition of any individual, or even of any individual generation. Yet every individual is formed by it and carries it on; at the worst he may injure or retard its growth; at the best he will add a mite to the infinite sum from which his own powers arise.

Substantially, though not uniformly or exactly, this has been always the case. In our own day, science, the closer organization induced by industry, the consciousness of a common humanity, have knit together the social whole. The child's inheritance has become consolidated, and the spirit of its administration has changed with the change in the property.

All great consolidations of mankind have rested necessarily on some elements of justice and well-being. Principles of humanity, and not of tyranny and exploitation, bound together the Hellenic world, the Roman Empire at its widest, the Catholic Church, the communities of Buddha and Confucius in the East. And now, of all consolidators, science is showing its supreme fitness and its kinship with the sense of a common humanity. It would be a fascinating and untrodden path, to follow in the ancient world the extension of scientific knowledge and note its coincidence with the growth of a more humane spirit in religion, in poetry, and in law. We believe the agreement would be close and that it is more than a mere coincidence. But here the evidence would be slighter and less conclusive: in the modern world the case is clear. Side by side with the growth of science, which is also the basis of the material prosperity and unification of the world, has come a steady

deepening of human sympathy, and the extension of it to all weak and suffering things. The seventeenth century, which saw modern science adolescent, ended judicial torture and religious barbarities for England. The eighteenth, which carried science further, saw France abandon torture, and England and France begin to free their slaves and protect their women and children by law. The nineteenth, which completed the triumph of science in the intellectual sphere, humanized the law and began the systematic raising of the poor, and the systematic national training of the young. Science, founding a firmer basis for the co-operation of mankind, goes widening down the centuries, and sympathy and pity bind the courses together. At the end of this process, where both human strength and human sympathy are at their height, comes the child, fit object for both the tenderest affection and the profoundest knowledge, at once the weakest and the richest, the most tearful and the happiest, the most helpless and the most hopeful of all created things.

The child stands, too, at the end of another avenue of thought. We remarked, in treating of the rise of modern science, that the ancients did not advance on the whole beyond the simple notions of balance and proportion, either in mathematics or in social science. The laws of motion, and still more of organic growth, were beyond their ken. Galileo inaugurated a new era with the first true law of motion which man discovered. The history of modern science, following this, is the history of the reduction of all kinds of motion and change to law. First, in the inanimate world curves and equations

were devised, capable of summing up and expressing all orderly motion: then, within the last century, the laws of organic growth were investigated and certain approximations reached. The study of growth carried the mind further and further back. What has been always an object of man's untutored curiosity, now becomes the dominant interest of the latest stage of science. It craves to know the earliest history of everything, above all of human institutions and ideas. Here again the child meets us, the living embodiment of human origins. His growth unfolds the broad outlines of the past: his capacities contain the future. He is the epitome of all the laws of evolution, in the form most nearly touching our intellectual curiosity, our affection and our hope.

And with the study of the past in all its forms, our interest in the future has been immeasurably enhanced. We know that the stream which bears us on from the infinite behind us will not slack its course, and we begin to recognize a regular movement and a certain goal. The stream is unbroken, and the past lives on. But while we look back with reverence, the heart goes out to those who are to travel furthest and see the fuller light.

ILLUSTRATIVE TIME CHARTS

NOTES IN EXPLANATION

These charts illustrate a simple plan for representing the lapse of time spatially.

Equal spaces are allotted in each chart to equal periods.

No dates are given, but names and events are placed in their relative order and as near as possible to their right position in the century.

The first chart thus shows the long duration of the early theocracies compared with the rapid rise and short flourishing of the Greek spirit at its best.

In the other charts parallel columns show the intellectual and practical evolution in the central countries.

The names included are almost exclusively those given in the text.

Millenniums.	
B. C. 4000	Egyptian Calendar settled. Pyramids built.
3000	
2000	Hammurabi. Babylonian Empire founded.
	Bronze Age in Aegean Civilization. Hebrew Tribes enter Palestine. Achaean Migrations.
1000	
	Greek Colonies.
500	Athenian Supremacy.
A.D.	Greece a Roman Province.

Centuries.	*Thought.*	*Action*	*Other Contemporary Events.*
B. C. 1000	Homer begun	Troy fallen	Solomon's Temple.
	Greek Alphabet	Ionian colonization Dorian colonization	
900			
	First Iliad	City-states founded	
800	Hesiod		
		Foundation of Rome Rise of aristocracies Greek colonies in the West	
700			Hebrew prophets, Hosea, Isaiah, Amos
		Tyrannies in Ionia	
600	Solon Thales	Solon in Athens	
		Peisistratus Tyrant	Croesus.
	Pythagoras Homer revised	Expulsion of Tarquins	Cyrus. Darius. Buddha. Confucius.
500		Marathon XII Tables Salamis	
	Aeschylus Herodotus	Tribunes	
	Sophocles Anaxagoras Phidias	Pericles	
	Euripides Hippocrates		
400	Socrates Thucydides	Peloponnesian War	
	Plato Democritus	Plebeian consuls	
	Aristotle Eudoxus		
		Alexander	
300	Euclid		
		Pyrrhus	
	Aristarchus Archimedes Zeno		Hannibal.

Centuries.	*Thought.*	*Action.*	*Other Contemporary Events.*
B. C. 200	Apollonius of Perga		
	Hipparchus	Destruction of Carthage	
		Greece a Roman Province	
100	Cicero	Pompey in Asia Minor	
	Lucretius	Caesar in Gaul	
	Virgil and Horace	Civil War	
		Actium	
		Augustus Princeps	
A. D.			
		Conquest of Britain	
	S. Paul's Epistles Philo		
100	The Stoic Epictetus		
	Pliny the Younger	Trajan	Roman Empire reaches greatest extent.
	Ptolemy	Hadrian	
	Gaius	Antoninus	
		Marcus Aurelius	
200			
		Inroad of barbarians	
300		Diocletian	
		Constantine	
	Pappus		
400	S. Augustine	Sack of Rome by the Goths	
		End of Western Empire	Rise of the Franks. Conversion of Clovis.
500			

Centuries.	*Thought.*	*Action.*	*Other Contemporary Events.*
A.D. 400	S. Augustine	Romans leave Britain	Saxon invasion o Britain.
		Last Emperor of the West	
500	S. Benedict	Justinian	
600	Gregory the Great		Conversion of Kent.
			Mahomet.
700	S. Boniface	Charles Martel at Tours	Arabs conquer Spain.
800		Charlemagne crowned	Egbert.
	Scotus Erigena	Holy Roman Empire divided at Verdun	Alfred.
900			
1000	Avicenna		
	Gregory VII Hildebrand	Henry IV	William the Conqueror.
1100	S. Bernard	First Crusade	
1200	Dominicans and Franciscans Aquinas Roger Bacon Dante	Gothic Cathedrals S. Louis Sixth Crusade	John submits to Innocent III. Friar William's Mission to the East.
1300	Boniface VIII Wiclif	Hundred Years' War begins	
1400			

Centuries.	*Thought.*	*Action.*	*Other Contemporary Events.*
A.D. 1300	Boniface VIII	First True Parliament First States-General	
	Popes at Avignon, 70 years		
	Petrarch Gunpowder	Cressy Poitiers	
	Chaucer Wiclif		
1400	Vittorino da Feltre		
		Agincourt	
		Joan of Arc	
	Invention of Printing		Turks take Constantinople.
	Leonardo	Louis XI	Tudors.
1500	Michelangelo Raphael Copernicus Erasmus and Luther	Discovery of America and Cape route to East	
	Calvin and Loyola	Charles V	
	Council of Trent and Charles Borromeo	Defeat of Spain under Philip II Henri IV	Elizabeth and William the Silent.
1600	Shakespeare Bruno burnt Bacon		
	Galileo Kepler Harvey Birth of Newton Descartes	Thirty Years' War	Cromwell.
	George Fox and Bunyan		English Revolution.
1700	Leibnitz Death of Newton	Louis XIV and William of Orange	

Centuries.	*Thought.*	*Action.*	*Other Contemporary Events.*
A.D. 1700	Death of Newton		
		Peter the Great	
	Black and Watt		
		Frederic the Great	
			Quebec and Plassey.
	Voltaire and Adam Smith	American Rebellion	
	Priestley and Lavoisier	French Revolution	
	Kant and Condorcet		
1800	Goethe and Scott		
		Waterloo	
	Beethoven	First Railway	
		Reformed Parliament	Alexander von Humboldt, first international scientific survey.
	Death of Bentham		
	Comte and Spencer		
	Origin of Species		
		Franco-Prussian War	
1900	Einstein's Theory of Relativity	The Great War	The League of Nations.

APPENDIX ON BOOKS

It may be useful to give the names of a few books which illustrate the argument of the foregoing chapters. The choice has been guided by three chief considerations. It is, in the first place, mainly a personal list, books found of use and pleasure, and fitting in with the theme of the preceding chapters. They are, secondly, for the most part easily accessible books, each section containing some of the primers which provide for the present age in rich abundance what Molière considered the ideal of a feminine education—'les clartés de tout'. The third test has been that, as far as possible, the books selected should aim at giving a synthetic point of view, looking at all sides of their subject and seeing it in relation to man's evolution as a whole. In seeking books of this sort we must turn to France and Germany, and, we may add, the United States. To read easily the languages of the other two members of the real triple alliance of culture is increasingly useful for us, though unfortunately not increasingly common. In respect of synthetic books on history, these nations have long anticipated us; and the French have acquired a special talent, unmatched in the world, for clear and attractive exposition of complicated matters.

It will be noticed that works of poetry and fiction are not included. The great poets, however, have a large share in earlier pages, and it is almost unnecessary to point out the value of such books as Scott's *Talisman* and *Ivanhoe* for chapter 6 and Reade's *Cloister and the Hearth* for chapter 7.

CHAPTER 2. THE CHILDHOOD OF THE RACE

Tylor's *Primitive Culture* (Murray) and *Manual of Anthropology* (Macmillan), still the leading books in English.

Arthur Keith's *Antiquity of Man* (Williams & Norgate).

R. R. Marett's *Anthropology* (Home University Library),

a brilliant, short sketch, sane and free from fallacious bias, on the great topics such as race, religion, psychology, and folk-lore (Methuen).

Darwin's *Descent of Man* (Murray), and Huxley's *Man's Place in Nature*, &c. (Eversley Series), classics in the history of the subject, the latter interesting on the controversial stages.

Durkheim's *La Méthode sociologique* (Félix Alcan), the best short statement of what facts and ' laws ' in sociology really mean. The volumes of the *Année Sociologique* contain masses of material on special questions.

Robertson Smith's *Religion of the Semites* (Black), and

J. L. Myres, *The Dawn of History* (H.U.L.).

(F. B. Jevons, *Introduction to the History of Religion* (Macmillan).)

J. G. Frazer, *Golden Bough*, a great reference work, summarized by Marett or Farnell.

Chapter 3. The Early Empires

The Century Bible (Jack), especially for the Prophets and other Old Testament books.

Sir Gaston Maspero, *The Dawn of Civilization*, the best general account of the early civilization of Egypt and Chaldaea, a beautiful and interesting book (S.P.C.K.).

J. H. Breasted, *History of the Ancient Egyptians* (Smith, Elder, & Co.), short, reliable, and complete. Also articles on Egypt in the *Encyclopaedia Britannica*.

C. H. W. Johns, *Ancient Assyria*, *Ancient Babylonia* (Cambridge University Press).

H. R. H. Hall, *Ancient History of the Near East* (Methuen).

Flinders Petrie, *Religion of Ancient Egypt* (Constable), and many other works.

On the Minoan Age in Crete :

R. M. Burrows, *The Discoveries in Crete* (Murray).

Baikie, *The Sea Kings of Crete*, an excellent, short, popular book (Black).

CHAPTER 4. GREECE

R. R. Marett, *Anthropology and the Classics* (Clarendon Press).

Grote, *History of Greece*. Abridgement by Messrs. Mitchell and Caspari, concentrating on the Athenian Democracy (Routledge).

J. B. Bury, *History of Greece* (Macmillan), the best modern political history in English.

Gilbert Murray, *The Rise of the Greek Epic* (Clarendon Press), full of charm, suggestion, and learning, and *Four Stages of Greek Religion*.

A. E. Zimmern, *The Greek Commonwealth* (Clarendon Press), a vivid modern sociological study, largely a commentary on Pericles' Funeral Oration in Thucydides.

J. P. Mahaffy, *Alexander's Empire* (Story of the Nations Series).

T. R. Glover, *From Pericles to Philip* (Methuen).

Of the primers we have at present Fyffe's Primer on Greece and Jebb's on Homer in Macmillan's series.

On Greek science we are fortunate in having the exhaustive labours in English of

Sir T. L. Heath, *The Works of Archimedes*, with the recently discovered *Method of Archimedes* (Cambridge Press), *Apollonius of Perga* (now published by the Clarendon Press), and *Aristarchus of Samos* (Clarendon Press), practically a history of Greek astronomy.

G. J. Allman, *Greek Geometry from Thales to Euclid* (Longmans).

Of the Greek philosophers the best account is the translation of Gomperz' *Greek Thinkers* in 4 vols. (Murray, first vol. most useful on the early thinkers down to the Sophists.)

J. Burnet, *Greek Philosophy* (Macmillan).

Aristotle. The scientific works are accessible in a translation edited by W. D. Ross and J. A. Smith (Clarendon Press). His scientific achievements are summarized by D'Arcy W.

Thompson, *Aristotle as a Biologist* (Clarendon Press), and T. E. Lones, *Aristotle's Researches in Natural Science* (West Newman & Co.) and G. H. Lewes's very interesting though somewhat antiquated *Aristotle, a Chapter from the History of Science* (Smith, Elder).

Of the Greek classics in translation the following have some special connexion with the matter of the chapter:

Herodotus, *Story of the Persian War* (Tancock—published Murray).

Plato, *The Euthyphro, Apology*, and *Crito* (translation published by Dent). *The Republic* (Davies and Vaughan—published Macmillan).

Jowett's *Euthyphro, Crito, Apology*, and *Phaedo*, in one volume (Oxford Library of Translations). *Republic*, in two volumes.

Aristotle's *Politics* (with introduction by H. W. C. Davis, Clarendon Press).

Crawley's *Thucydides* (Temple Classics).

Xenophon, *Education of Cyrus* (translation by Dakyns, Everyman's Library).

Homer, *Adventures of Odysseus*, and *Story of Iliad*, Marvin, Mayor, and Stawell (Dent), *Euripides*, Translations by Gilbert Murray.

For Greek sculpture, only slightly touched on in the chapter:

P. Gardner, *Handbook of Greek Sculpture* (Macmillan).

L. E. Upcott, *Introduction to Greek Sculpture* (Clarendon Press).

W. R. Lethaby, *Architecture* (H.U.L.).

Chapter 5. Rome

Mommsen's *History of Rome* (now in Everyman's Library), with the volume on the Provinces.

Maine's *Ancient Law* (New Universal Library), far the best sketch of the main stages in the evolution of Roman Law.

Warde Fowler's *Julius Caesar* (Heroes of the Nations); *Religious Experience of the Roman People* (Macmillan).

Fustel de Coulanges, *La Cité antique*, a brilliant study of the City-State with special (and undue) stress on its religious basis.

Mackail's *Latin Literature* (Murray).

Plutarch, *Coriolanus*, *Caesar*, *Brutus*, *Antonius* in North's translation edited by Carr; *Select Essays* (Clarendon Press).

On the Empire:

Gibbon's *Decline and Fall* (Bury's edition). A selection of the most important chapters is given in Frederic Harrison's *Choice of Books* (Macmillan).

T. R. Glover, *Life and Letters in the Fourth Century* (Cambridge Press).

Gwatkin, *Early Church History*, especially for Diocletian (Macmillan).

Bury, *History of the Roman Empire* (Murray), and *Constitution of the Later Roman Empire* (Cambridge Press).

Marcus Aurelius, *Meditations* (J. Jackson. Oxford Library of Translations. Also World's Classics).

Stuart Jones, *Roman Empire* (Story of the Nations Series).

Of the primers. Creighton's *Rome* (Macmillan) and Warde Fowler's *Rome* (Home University Library).

CHAPTER 6. THE MIDDLE AGES

Dr. Hodgkin, *Italy and her Invaders* (Clarendon Press); *Charles the Great* (Macmillan).

Bryce, *Holy Roman Empire* (Macmillan).

Milman, *Latin Christianity* (Murray).

T. F. Tout, *The Empire and the Papacy* (Rivingtons).

Renan, *History of the People of Israel* (Chapman) and *Origins of Christianity* (Mathieson), the greatest complete treatment of the subject, from an obvious point of view; the

volume on Marcus Aurelius (translation in the Scott Library) is especially noteworthy.

W. P. Ker, *Dark Ages* (Blackwood).

J. Cotter Morison, *Life of St. Bernard* (Macmillan), the best biography of a leading mediaeval spiritual figure.

H. W. C. Davis, *Mediaeval Europe* (Home University Library), one of the best volumes in the series.

For mediaeval thinkers :

G. G. Coulton, *Social Life in Britain from the Conquest to the Reformation* (Cambridge Press).

The Introduction to Dr. Bridges' *Opus Majus of Roger Bacon* is enlightening ; now published separately (Williams & Norgate).

Dante, translation of *Divina Commedia* by Carlyle (Dent), with full notes and explanations.

Thomas Carlyle on Dante, in *Heroes and Hero Worship* ; *Past and Present*, for the life of the monks (Temple Classics). The latter is now further illustrated by the volume on *Jocelyn of Brokeland* in the ' King's Classics '.

Joinville's *Life of St. Louis* (Low). Froissart's *Chronicles* (Everyman's Library), and D. Murray's *Jeanne d'Arc* (Heinemann), the documents of her Trial.

Osborn Taylor, *The Mediaeval Mind* (Macmillan).

Chapter 7. The Renascence

P. S. Allen, *The Age of Erasmus* (Clarendon Press).

Lord Acton, *Lectures on Modern History* (Macmillan).

J. A. Symonds, *The Renaissance in Italy* (Murray, cheap edition), and *Life of Michelangelo Buonarroti* (Macmillan).

Cambridge Modern History, the chapter on the Age of Discovery.

Washington Irving, *Life of Columbus* (Heroes of the Nations).

Ranke's *History of the Popes* (Bell), the standard book on the later Papacy.

On the political side :

Motley's *Rise of the Dutch Republic*, the classic on the greatest war for national independence (World's Classics).

Dr. Bridges, *France under Richelieu and Colbert* (new edition, with introduction by A. J. Grant. Macmillan).

Biographies : *Elizabeth* and *Cromwell* in English Statesmen (Macmillan) ; *William the Silent*, Foreign Statesmen (Macmillan) ; *Richelieu* (Heroes of the Nations).

Carlyle's *Cromwell* (Routledge's Excelsior Library).

On English History generally in the seventeenth century :

G. M. Trevelyan, *England under the Stuarts* (Methuen), a brilliantly written account of the most critical period in our national history, scrupulously fair to individuals.

On Shakespeare :

Shakespeare's England (Clarendon Press).

Jusserand's third volume of his *Literary History of the English People* (Unwin), perhaps the best general account.

Milton's *Tractate on Education* (Pitt Press Series), the best summary of the humanist ideal.

On the Reformation :

Frederic Seebohm, *The Protestant Revolution* (Longmans' Epochs).

Chapter 8. The Rise of Modern Science

Galileo, *The Two New Sciences* (Macmillan), his own account in later life of the course of his discoveries.

Bacon, *Advancement of Learning* (World's Classics), and *Novum Organum* (New Universal Library).

Descartes, *Discours de la Méthode* (translation in Everyman's Library).

Mach, *History of Mechanics* (translation, Kegan Paul & Co., London), a fascinating short study of the historical development of a fundamental branch of science.

Sir Michael Foster, *Lectures on the History of Physiology*

(Cambridge University Press), a worthy companion volume to Mach.

Sir Oliver Lodge, *Pioneers of Science* (Macmillan), a more popular account of Galileo, Kepler, &c.

Berry, *Short History of Astronomy* (Murray).

Dr. Bridges, Harveian Oration on 'Harvey and his Successors' in *Essays and Addresses* (Chapman & Hall), and Harvey's *Circulation of the Blood* (Everyman's Library).

Whitehead, *Introduction to Mathematics* (Home University Library), a most suggestive essay, which should be accompanied by some knowledge of the Calculus, e. g. *Calculus made Easy* (Macmillan).

Rouse Ball, *Short History of Mathematics* (Macmillan).

Sir David Brewster, *Life of Sir Isaac Newton* (Gall & Inglis).

J. A. Thomson, *Science in the Nineteenth Century* (Chambers).

Chapter 9. Industrial Revolution

Mantoux, *La Révolution industrielle en Angleterre*, much the best book, with full bibliography; unfortunately was sold out within two years of publication (1908) and can for the present only be seen at libraries.

P. E. B. Jourdain, *Introduction to Mathematics* (People's Books).

Toynbee, *Industrial Revolution*, the smaller pioneer work interesting historically (new edition 1901, with life by Lord Milner—published Longmans).

Adam Smith, *Wealth of Nations* (World's Classics).

Smiles, *Lives of the Engineers* and *Industrial Biography* (Murray).

J. S. Hammond, *The Village Labourer* 1760–1832 (Longmans) and *The Town Labourer*.

Hutchins and Harrison, *History of Factory Legislation* (King).

Townsend Warner, *Tillage, Trade, and Invention* (Blackie), a small useful book.

E. Lipson, *Introduction to the Economic History of England* (Black).

CHAPTER 10. REVOLUTION

Mrs. Gardiner, *French Revolution* (Longmans), best short sketch.

Carlyle, *French Revolution* (Dent's edition), taken with Mazzini's criticisms in the 4th volume of his *Life and Writings*.

Wordsworth, *The Prelude*.

Burke, *Reflections on the Revolution in France* (World's Classics).

Condorcet, *Tableau historique des progrès de l'esprit humain* (Paris, Steinheil).

Rousseau, *Contrat social* (translation in Everyman's Library).

Kant, *Principles of Politics* (edited and translated by Hastie, 1891—published Clark), contains the smaller works on Universal History, Perpetual Peace, and the Principle of Progress, which are of high importance.

H. A. L. Fisher, *Napoleon* (Home University Library), latest account, impartial and masterly.

Romain Rolland, *Beethoven* (Paris, Ed. Pelletan), a moving account of the composer's life-work from its personal aspect.

Ruskin, *Modern Painters* (Selections in Nelson's Sixpenny Classics), gives the new spirit towards nature, especially as expressed by Turner.

CHAPTER 11. PROGRESS AFTER REVOLUTION

McCunn, *Six Radical Thinkers* (Arnold).

Sidney and Beatrice Webb, *History of Trade Unionism* (Longmans).

J. T. Merz, *History of European Thought in the Nineteenth Century*, 5 volumes (Blackwood).

Bentham, *Theory of Legislation* (Clarendon Press).

Graham Wallas, *Francis Place* (Longmans).

Mill, J. S., *Autobiography* (Longmans), *Liberty*, and *Representative Government* (World's Classics).

Comte, Historical Philosophy in vol. iii of Harriet Martineau's *Comte's Positive Philosophy* (Bell).

Darwin, *Origin of Species* (World's Classics).

H. Poincaré, *La Valeur de la Science; Science et Hypothèse; Dernières Pensées* (Flammarion—Bibliothèque de Philosophie Scientifique—an excellent series).

Karl Pearson, *The Grammar of Science* (3rd edition, Black), represents in England the attitude of Mach in Germany and Poincaré in France.

Moritz Schlick, *Space and Time in Contemporary Physics* (Oxford Press).

On the political side:

G. Lowes Dickinson, *Revolution and Reaction in Modern France* (George Allen).

Germany in the Nineteenth Century (Manchester University Press). Essays by Holland Rose, Herford, Sadler, and Gonner.

J. W. Headlam, *Bismarck* (Heroes of the Nations).

E. Martinengo Cesaresco, *The Liberation of Italy* (Seeley), by a member of one of the great liberating families.

Driault et Monod, *L'Evolution du monde moderne: Histoire politique et sociale*, 1815–1909 (Félix Alcan), the best general short sketch of the nineteenth century, giving due place to the different nations and the different sides of the evolution.

Some Useful General Books

The New Calendar of Great Men (Macmillan). Biographies of over five hundred worthies before the mid-nineteenth century, arranged according to their historical import. A new edition is in preparation.

G. P. Gooch, *Annals of Politics and Culture* (Cambridge Press).

H. G. Wells, *Outlines of History* (Newnes).

An historical atlas, e. g. that published in the Everyman's series or Professor Ramsay Muir's.

For these and a far wider selection of books on kindred subjects, membership of the London Library will be found of the greatest value.

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